Refine Search

Search Results -

Terms	Documents
705.clas.	43365

Database:

US Pre-Grant Publication Full-Text Database
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IBM Technical Disclosure Bulletins

Search:

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Search History

DATE: Saturday, July 22, 2006 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR		
L27	705.clas.	43365	L27
L26	705/38	1036	L26
L25	705/36r	50	L25
L24	705/35	2536	L24
L23	L22 and "optimal portfolio"	48	L23
L22	L21 aznd benchmark$	11949	L22
L21	l11 and "efficient frontier"	5	L21
L20	L19 and 705/36	63	L20
L19	(portfolio with scenarios or portfolio near scenarios or portfolio adj scenarios)	253	L19
L18	L17 and future	121	L18
L17	l16 and disaggregat$	129	L17
L16	L15 and value	5257	L16
L15	portfolio	8378	L15

L14	('20010011243'| 'WO009854666A1'| '5799287'| '5148365'| 'EP000686926A2'| '6278981')[URPN]	100	L14
DB=USPT; PLUR=YES; OP=OR			
L13	(5893079 | 5774880 | 4953085 | 4722055 | 5799287 | 4744027 | 4744026 | 5148365 | 4346442 | 4642768 | 5101353 | 4674044 | 4694397 | 4752877 | 4797839 | 4744028)![PN]	16	L13
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L12	('5799287'| '6278981')[ABPN1,NRPN,PN,TBAN,WKU]	4	L12
DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L11	(optimal near portfolio or optimal with portfolio or optimal adj portfolio)	41	L11
DB=EPAB,JPAB; PLUR=YES; OP=OR			
L10	(optimal near portfolio or optimal with portfolio or optimal adj portfolio)	6	L10
L9	L4 and benchmark	0	L9
L8	L7	2	L8
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L6	L2 and benchmark	6	L6
L5	L4 and benchmark	6	L5
L4	L3 and value	7	L4
L3	L2 and future	7	L3
L2	L1 and disaggregat$	7	L2
L1	(optimal near portfolio or optimal with portfolio or optimal adj portfolio)	267	L1

END OF SEARCH HISTORY

First Hit Fwd Refs Previous Doc Next Doc Go to Doc#

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L7: Entry 5 of 9 File: USPT Aug 21, 2001

US-PAT-NO: 6278981
DOCUMENT-IDENTIFIER: US 6278981 B1
**** See image for Certificate of Correction ****

TITLE: Computer-implemented method and apparatus for portfolio compression

DATE-ISSUED: August 21, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dembo; Ron Samuel	Ontario			CA
Kreinin; Alexander Yacov	Thornhill			CA
Rosen; Dan	Toronto			CA

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Algorithmics International Corporation	Ontario			CA	03

APPL-NO: 09/084923 [PALM]
DATE FILED: May 28, 1998

PARENT-CASE:
This application claims priority to Provisional Application No. 60/057,927, filed May 29, 1997.

INT-CL-ISSUED: [07] G06 F 17/60

US-CL-ISSUED: 705/36
US-CL-CURRENT: 705/36R

FIELD-OF-CLASSIFICATION-SEARCH: 705/36, 705/37
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
4346442	August 1982	Musmanno	364/408
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☐	5799287	August 1998	Dembo	705/36
☐	5893079	April 1999	Cwenar	705/36

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ART-UNIT: 213

PRIMARY-EXAMINER: Hafiz; Tariq R.

ASSISTANT-EXAMINER: Meinecke-Diaz; Susanna

ATTY-AGENT-FIRM: Kenyon & Kenyon

ABSTRACT:

A computer-implemented method for compressing a portfolio of financial instruments is described. Financial instruments to be compressed are identified, and a compressed subportfolio corresponding to the identified financial instruments is generated. The compressed subportfolio and any non-compressed financial instruments are then combined into a compressed portfolio.

20 Claims, 7 Drawing figures

Previous Doc Next Doc Go to Doc#

First Hit Fwd Refs Previous Doc Next Doc Go to Doc#

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L23: Entry 43 of 48 File: USPT Jun 2, 1998

DOCUMENT-IDENTIFIER: US 5761442 A - BARR et al.
TITLE: Predictive neural network means and method for selecting a portfolio of securities wherein each network has been trained using data relating to a corresponding security

Brief Summary Text (2):
The present invention relates to a financial data processing system and method designed for investors whose objective is to obtain a return on their investment portfolio which is superior to the broad index benchmarks of a given capital market. More particularly, the system and method of this invention are preferably carried out using artificial neural networks capable of estimating the appreciation potential of the individual securities in a capital market. The system of this invention uses the appreciation estimates for the individual securities to create and administer investment portfolios with varying time horizons.

Brief Summary Text (7):
Among the various investment options, mutual funds which offer a variety of investment options tailored to specific customer needs have gained popularity in last few years. One such option is presented by the so-called indexed stock funds which are designed to track the performance of broader market benchmarks, such as the S&P (Standard & Poor's) 500 index. The S&P 500 index is a market capitalization weighted basket of the stocks of 500 large companies, indicative of the performance of the U.S. equity markets. The indexed stock funds usually invest in the stocks of the S&P 500 companies targeting their relative weights in the index and, therefore, directly track the performance of the S&P 500 index, aided by lower asset research fees and transaction costs. Such financial products offer convenience and relatively low fees but are meant to follow and match the market, not outperform it.

Brief Summary Text (8):
If the investment goal is to surpass the underlying market benchmark, the task becomes one of holding a smaller subset of all stocks of the market, such that this subset has a higher expected return and about the same level of risk as the market index. Such task requires one to focus on individual stocks and their performance in relation to the index that serves as the underlying performance benchmark. Individual stocks usually have their own unique performance characteristics. Information that is specific to a particular stock includes earnings-related data, the company's growth plans, personnel changes and the public's perception of the company. While some of these factors (such as personnel) are not readily quantifiable, others such as earnings and projections (e.g., earnings estimates and their revisions) can be quantified. Clearly, however, the relationships among such data are complicated and frequently non-linear, making them difficult to analyze. In summary, an investment decision in the modern capital markets requires processing of large volumes of data and taking into account a number of factors which may exhibit significant non-linear relationships among different components of the data.

Brief Summary Text (26):
More specifically, the portfolio of stocks is created in accordance with the present invention using a portfolio optimizer which employs the performance

potentials estimated by the neural nets, a measure of how good the estimates are, forecasts of economic and financial variables, risk allocation factors, investor preferences and guidelines, and other factors. This optimizer is designed to suggest a portfolio of stocks which is expected to have similar risk as the overall capital market (or risk according to the investor's preference), but to outperform the investment return of the associated market benchmarks over a predetermined period of time.

Detailed Description Text (5):
The combined technical and fundamental information from blocks 10, 20 and 30 is then passed to pre-processing block 40, which indicates the functions performed by the system 305 in FIG. 1. Pre-processing block 40 generates a number of data sequences, each sequence representing the values of certain parameters of the stock computed at predetermined time intervals in the past, preferably one week apart. These data sequences are specific for each stock and are subsequently used to train the neural net for each stock. Each data sequence has been historically found to relate to the performance of the stocks and thus may be used as a predictor of their future performance. Appendix A provides a listing of the data sequences of the preferred embodiment of the present invention, along with their definitions, which are preferably generated at block 40. This data includes the parameter BETA (.beta.) which is a measure of volatility of the stock relative to an underlying benchmark; ALPHA (.alpha.) which is a measure of the excess return of the stock over the beta-adjusted benchmark; the standard deviation of the parameter ALPHA computed over a predetermined period of time; the slope of the earnings surprise rankings and other parameters, as defined in Appendix A and explained in more detail below. On the basis of the present disclosure, a person skilled in the art will be able to use other parameters as well.

Detailed Description Text (39):
Typically, the selected optimized portfolio contains much fewer stocks than the underlying performance benchmark portfolio (such as the S&P 500 Index or the S&P 400 MidCap Index). This is because the portfolio creation process concentrates on stocks that have a large appreciation potential along with favorable liquidity and risk characteristics.

Detailed Description Text (41):
In operation, data processing system 330 continuously monitors the performance of the optimized portfolio and compares its overall investment return to the broad market benchmarks of the associated capital market. In addition, neural nets 300 compute the appreciation potential parameter ALPHA for each stock in the market. This information is processed by the portfolio optimizer in system 310 which determines the composition of the optimized portfolio. In the U.S. capital markets this portfolio includes about 50-70 stocks; for example, the MidCap portfolio has about 60 stocks out of a total of 400 stocks. If the system detects a degradation in the cumulative ALPHA parameter of the portfolio, or if the neural nets indicate high appreciation potential in stocks which are not included in the optimized portfolio or low potential in stocks which are part of the optimal portfolio, the composition of the portfolio can be changed.

CLAIMS:

4. The system of claim 2 wherein the portfolio optimization means comprises:

storage means for storing data for each security in the capital market; and

optimization means for selecting an optimal portfolio on the basis of the input from the storage means; wherein the optimization means operate in accordance with an optimization function using a set of constraints on the estimated appreciation potential of each security, risk factors and investor preferences.

Previous Doc Next Doc Go to Doc#

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Set	Items	Description
S1	2048	S OPTIMAL? (W) PORTFOLIO?
S2	926	S S1 NOT PY>1999
S3	213	S S1 AND S2 AND AGGREGAT?
S4	0	S S1 AND S2 AND DISAGGREGAT$
S5	61410	S FUTURE? (N2) VALUE?
S6	43	S S1 AND S2 AND S5
S7	680	S (PORTFOLIO? (N2) SCENARIOS? OR PORTFOLIO? (W2) SCENARIOS?)
S8	0	S DISAGGREGAT$
S9	1	S DISAGGRAT?
S10	18318	S DISAGGREGAT?
S11	2	S S7 AND S10
S12	2	RD (unique items)
S13	4849	S PORTFOLIO? (W2) THEORY?
S14	0	S DISAGGREGAT$
S15	18318	S DISAGGREGAT?
S16	91	S S13 AND S15
S17	113378	S VALUE? (W2) MARK?
S18	14	S S16 AND S17
S19	12	RD (unique items)

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[File 15] **ABI/Inform(R)** 1971-2006/Jul 21

[File 9] **Business & Industry(R)** Jul/1994-2006/Jul 21

[File 16] **Gale Group PROMT(R)** 1990-2006/Jul 21

[File 148] **Gale Group Trade & Industry DB** 1976-2006/Jul 21

[File 160] **Gale Group PROMT(R)** 1972-1989

[File 275] **Gale Group Computer DB(TM)** 1983-2006/Jul 21

[File 621] **Gale Group New Prod.Annou.(R)** 1985-2006/Jul 21

[File 636] **Gale Group Newsletter DB(TM)** 1987-2006/Jul 21

[File 20] **Dialog Global Reporter** 1997-2006/Jul 22

[File 476] **Financial Times Fulltext** 1982-2006/Jul 23

[File 610] **Business Wire** 1999-2006/Jul 22

**File 610: File 610 now contains data from 3/99 forward. Archive data (1986-2/99) is available in File 810.*

[File 613] **PR Newswire** 1999-2006/Jul 22

**File 613: File 613 now contains data from 5/99 forward. Archive data (1987-4/99) is available in File 813.*

[File 624] **McGraw-Hill Publications** 1985-2006/Jul 21

**File 624: Homeland Security & Defense and 9 Platt energy journals added Please see HELP NEWS624 for more*

[File 634] **San Jose Mercury** Jun 1985-2006/Jul 21

[File 810] **Business Wire** 1986-1999/Feb 28

[File 813] **PR Newswire** 1987-1999/Apr 30

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Set	Items	Description
S1	2048	S OPTIMAL? (W) PORTFOLIO?
S2	926	S S1 NOT PY>1999
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S5	61410	S FUTURE? (N2) VALUE?
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S7	680	S (PORTFOLIO? (N2) SCENARIOS? OR PORTFOLIO? (W2) SCENARIOS?)
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S9	1	S DISAGGRAT?
S10	18318	S DISAGGREGAT?
S11	2	S S7 AND S10
S12	2	RD (unique items)

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Set	Items	Description
S1	2048	S OPTIMAL? (W) PORTFOLIO?
S2	926	S S1 NOT PY>1999
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S12	2	RD (unique items)

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[File 15] **ABI/Inform(R)** 1971-2006/Jul 21

[File 9] **Business & Industry(R)** Jul/1994-2006/Jul 21

[File 16] **Gale Group PROMT(R)** 1990-2006/Jul 21

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[File 160] **Gale Group PROMT(R)** 1972-1989

[File 275] **Gale Group Computer DB(TM)** 1983-2006/Jul 21

[File 621] **Gale Group New Prod.Annou.(R)** 1985-2006/Jul 21

[File 636] **Gale Group Newsletter DB(TM)** 1987-2006/Jul 21

[File 20] **Dialog Global Reporter** 1997-2006/Jul 22

[File 476] **Financial Times Fulltext** 1982-2006/Jul 23

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**File 613: File 613 now contains data from 5/99 forward. Archive data (1987-4/99) is available in File 813.*

[File 624] **McGraw-Hill Publications** 1985-2006/Jul 21

**File 624: Homeland Security & Defense and 9 Platt energy journals added Please see HELP NEWS624 for more*

[File 634] **San Jose Mercury** Jun 1985-2006/Jul 21

[File 810] **Business Wire** 1986-1999/Feb 28

[File 813] **PR Newswire** 1987-1999/Apr 30

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4/19/1 (Item 1 from file: 348) **Links**
EUROPEAN PATENTS

02070469
Panel of nucleic acid sequences for cancer diagnosis
Sammlung von Nukleinsaeuresequenzen zur Diagnose von Krebs
Panel d'acide nucleique pour le diagnostic du cancer
PATENT ASSIGNEE:
ORTHO-CLINICAL DIAGNOSTICS, INC., (1883715), 100 Indigo Creek Drive, Rochester,New York 14626-5101, (US), (Applicant designated States: all)
INVENTOR:
Wang, Yixin, 12511 El Camino Real Unit E, San Diego, CA 92130, (US)
LEGAL REPRESENTATIVE:
Mercer, Christopher Paul et al (46612), Carpmaels & Ransford, 43-45 Bloomsbury Square, London WC1A 2RA, (GB)
PATENT (CC, No, Kind, Date): EP 1679382 A2 060712 (Basic)
APPLICATION (CC, No, Date): EP 2006075499 030331;
PRIORITY (CC, No, Date): US 368667 P 020329
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR
RELATED PARENT NUMBER(S) - PN (AN):
EP 1355150 (EP 2003252023)
INTERNATIONAL CLASSIFICATION (V8 + ATTRIBUTES):
IPC + Level Value Position Status Version Action Source Office:
C12Q-0001/68 A I F B 20060101 20060607 H EP
ABSTRACT EP 1679382 A2
A method of diagnosing cancer by identifying differential modulation of each gene (relative to the expression of the same genes in a normal population) in a combination of genes selected from two groups of genes.
Gene expression portfolios and kits for employing the method are further aspects of the invention.
ABSTRACT WORD COUNT: 51

LEGAL STATUS (Type, Pub Date, Kind, Text):
Application: 060712 A2 Published application without search report
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200628	247
SPEC A	(English)	200628	5204
Total word count - document A			5451
Total word count - document B			0
Total word count - documents A + B			5451

SPECIFICATION EP 1679382 A2

BACKGROUND
This application claims the benefit of U.S Provisional Application No. 60/368,667 filed on March 29, 2002.
The invention relates to the selection of portfolios of diagnostic markers.
A few single gene diagnostic markers such as her-2-neu are currently in

use. Usually, however, diseases are not easily diagnosed with molecular diagnostics for one particular gene. Multiple markers are often required and the number of such markers that may be included in a assay based on differential gene modulation can be large, even in the hundreds of genes. It is desirable to group markers into portfolios so that the most reliable results are obtained using the smallest number of markers necessary to obtain such a result. This is particularly true in assays that contain multiple steps such as nucleic acid amplification steps.

SUMMARY OF THE INVENTION

The invention is a method of cancer by identifying differential modulation of each gene (relative to the expression of the same genes in a normal population) in a combination of genes selected from the group consisting of Seq. ID. No. 1-30, Seq. ID No. 32, Seq. ID No. 34 and Seq. ID No. 98. In another embodiment the combination is selected from the group consisting of Seq. ID No. 32-67 , Seq. ID No. 69, and Seq ID. No. 98-100.

Gene expression portfolios and kits for employing the method are further aspects of the invention.

DETAILED DESCRIPTION

The methods of this invention can be used in conjunction with any method for determining the gene expression patterns of relevant cells as well as protein based methods of determining gene expression. Preferred methods for establishing gene expression profiles include determining the amount of RNA that is produced by a gene that can code for a protein or peptide. This is accomplished by reverse transcriptase PCR (RT-PCR), competitive RT-PCR, real time RT-PCR, differential display RT-PCR, Northern Blot analysis and other related tests. While it is possible to conduct these techniques using individual PCR reactions, it is best to amplify copy DNA (cDNA) or copy RNA (cRNA) produced from mRNA and analyze it via microarray. A number of different array configurations and methods for their production are known to those of skill in the art and are described in U.S. Patents such as: 5,445,934; 5,532,128; 5,556,752; 5,242,974; 5,384,261; 5,405,783; 5,412,087; 5,424,186; 5,429,807; 5,436,327; 5,472,672; 5,527,681; 5,529,756; 5,545,531; 5,554,501; 5,561,071; 5,571,639; 5,593,839; 5,599,695; 5,624,711; 5,658,734; and 5,700,637; the disclosures of which are incorporated herein by reference.

Microarray technology allows for the measurement of the steady-state mRNA level of thousands of genes simultaneously thereby presenting a powerful tool for identifying effects such as the onset, arrest, or modulation of uncontrolled cell proliferation. Two microarray technologies are currently in wide use. The first are cDNA arrays and the second are oligonucleotide arrays. Although differences exist in the construction of these chips, essentially all downstream data analysis and output are the same. The product of these analyses are typically measurements of the intensity of the signal received from a labeled probe used to detect a cDNA sequence from the sample that hybridizes to a nucleic acid sequence at a known location on the microarray. Typically, the intensity of the signal is proportional to the quantity of cDNA, and thus mRNA, expressed in the sample cells. A large number of such techniques are available and useful. Preferred methods for determining gene expression can be found in US Patents 6,271,002 to Linsley, et al.;

6,218,122 to Friend, et al.; 6,218,114 to Peck, et al.; and 6,004,755 to Wang, et al., the disclosure of each of which is incorporated herein by reference.

Analysis of the expression levels is conducted by comparing such intensities. This is best done by generating a ratio matrix of the expression intensities of genes in a test sample versus those in a control sample. For instance, the gene expression intensities from a diseased tissue can be compared with the expression intensities generated from normal tissue of the same type (e.g., diseased colon tissue sample vs. normal colon tissue sample). A ratio of these expression intensities indicates the fold-change in gene expression between the test and control samples.

Modulated genes are those that are differentially expressed as up regulated or down regulated in non-normal cells. Up regulation and down regulation are relative terms meaning that a detectable difference (beyond the contribution of noise in the system used to measure it) is found in the amount of expression of the genes relative to some baseline. In this case, the baseline is the measured gene expression of a normal cell. The genes of interest in the non-normal cells are then either up regulated or down regulated relative to the baseline level using the same measurement method.

Preferably, levels of up and down regulation are distinguished based on fold changes of the intensity measurements of hybridized microarray probes. For example, in the case in which a 1.5 fold or more difference is used to make such distinctions, the diseased cell is found to yield at least 1.5 times more, or 1.5 times less intensity than the normal cells.

Other methods of making distinctions are available. For example, statistical tests can be used to find the genes most significantly different between diverse groups of samples. The Student's t-test is an example of a robust statistical test that can be used to find significant differences between two groups. The lower the p-value, the more compelling the evidence that the gene is showing a difference between the different groups. Nevertheless, since microarrays measure more than one gene at a time, tens of thousands of statistical tests may be asked at one time. Because of this, there is likelihood to see small p-values just by chance and adjustments for this using a Sidak correction as well as a randomization/permutation experiment can be made.

A p-value less than .05 by the t-test is evidence that the gene is significantly different. More compelling evidence is a p-value less then .05 after the Sidak correct is factored in. For a large number of samples in each group, a p-value less than 0.05 after the randomization/ permutation test is the most compelling evidence of a significant difference.

Genes can be grouped so that information obtained about the set of genes in the group provides a sound basis for making clinically relevant judgments such as a diagnosis, prognosis, or treatment choice. These sets of genes make up the portfolios of the invention. As with most diagnostic markers, it is often desirable to use the fewest number of markers sufficient to make a correct medical judgment. This prevents a delay in treatment pending further analysis as well as inappropriate use of time and resources. Preferred optimal portfolio is one that employs the fewest number of markers for making such judgments while meeting conditions that maximize the probability that such judgments are indeed correct. These conditions will generally include sensitivity and specificity

requirements. In the context of microarray based detection methods, the sensitivity of the portfolio can be reflected in the fold differences exhibited by a gene's expression in the diseased or aberrant state relative to the normal state. The detection of the differential expression of a gene is sensitive if it exhibits a large fold change relative to the expression of the gene in another state. Another aspect of sensitivity is the ability to distinguish signal from noise. For example, while the expression of a set of genes may show adequate sensitivity for defining a given disease state, if the signal that is generated by one (e.g., intensity measurements in microarrays) is below a level that easily distinguished from noise in a given setting (e.g., a clinical laboratory) then that gene should be excluded from the optimal portfolio. A procedure for setting conditions such as these that define the optimal portfolio can be incorporated into the inventive methods.

Specificity can be reflected in statistical measurements of the correlation of the signaling of gene expression with the condition of interest. If the differential expression of a set of genes is observed to produce a large fold change but they do so for a number of conditions other than the condition of interest (e.g. multiple disease states) then the gene expression profile for that set of genes is non-specific. Statistical measurements of correlation of data or the degree of consistency of data such as standard deviation, correlation coefficients, and the like can be a used as such measurements. In considering a group of genes for inclusion in a portfolio, a small standard deviation in expression measurements correlates with greater specificity. Genes that display similar expression patterns may be co-regulated by an identical factor that pushes the genes in the same direction. If this factor is sufficient but not necessary for classifying a sample, then these genes will fail to correctly identify a sample if the markers are all related to this single factor. Diversification then results in selecting as few markers as possible, yet covers as many different optimal expression patterns that are contained in the data set.

In the method of the invention, a group of genetic markers is selected for use in diagnostic applications. These groups of markers are "portfolios". Diagnostic applications include the detection or identification of a disease state or condition of a subject, determining the likelihood that a subject will contract a given disease or condition, determining the likelihood that a subject with a disease or condition will respond to therapy, determining the prognosis of a subject with a disease or condition (or its likely progression or regression), and determining the effect of a treatment on a subject with a disease or condition. For example, the method can be used to establish portfolios for detecting the presence or likelihood of a subject contracting colon cancer or the likelihood that such a subject will respond favorably to cytotoxic drugs.

The portfolios selected by the method of the invention contain a number and type of markers that assure accurate and precise results and are economized in terms of the number of genes that comprise the portfolio. The method of the invention can be used to establish optimal gene expression portfolios for any disease, condition, or state that is concomitant with the expression of multiple genes. An optimal portfolio in the context of the instant invention refers to a gene expression profile that provides an assessment of the condition of a subject (based upon the condition for which the analysis was undertaken) according to

predetermined standards of at least two of the following parameters: accuracy, precision, and number of genes comprising the portfolio.

Most preferably, the markers employed in the portfolio are nucleic acid sequences that express mRNA ("genes"). Expression of the markers may occur ordinarily in a healthy subject and be more highly expressed or less highly expressed when an event that is the object of the diagnostic application occurs. Alternatively, expression may not occur except when the event that is the object of the diagnostic application occurs.

Marker attributes, features, indicia, or measurements that can be compared to make diagnostic judgments are diagnostic parameters used in the method. Indicators of gene expression levels are the most preferred diagnostic parameters. Such indicators include intensity measurements read from microarrays, as described above. Other diagnostic parameters are also possible such as indicators of the relative degree of methylation of the markers.

Distinctions are made among the diagnostic parameters through the use of mathematical/statistical values that are related to each other. The preferred distinctions are mean signal readings indicative of gene expression and measurements of the variance of such readings. The most preferred distinctions are made by use of the mean of signal ratios between different group readings (e.g., microarray intensity measurements) and the standard deviations of the signal ratio measurements. A great number of such mathematical/statistical values can be used in their place such as return at a given percentile.

A relationship among diagnostic parameter distinctions is used to optimize the selection of markers useful for the diagnostic application. Typically, this is done through the use of linear or quadratic programming algorithms. However, heuristic approaches can also be applied or can be used to supplement input data selection or data output. The most preferred relationship is a mean-variance relationship such as that described in Mean-Variance Analysis in Portfolio Choice and Capital Markets by Harry M. Markowitz (Frank J. Fabozzi Associates, New Hope, PA: 2000, ISBN: 1-883249-75-9) which is incorporated herein by reference. The relationship is best understood in the context of the selection of stocks for a financial investment portfolio. This is the context for which the relationship was developed and elucidated.

The investor looking to optimize a portfolio of stocks can select from a large number of possible stocks, each having a historical rate of return and a risk factor. The mean variance method uses a critical line algorithm of linear programming or quadratic programming to identify all feasible portfolios that minimize risk (as measured by variance or standard deviation) for a given level of expected return and maximize expected return for a given level of risk. When standard deviation is plotted against expected return an efficient frontier is generated. Selection of stocks along the efficient frontier results in a diversified stock portfolio optimized in terms of return and risk.

When the mean variance relationship is used in the method of the instant invention, diagnostic parameters such as microarray signal intensity and standard deviation replace the return and risk factor values used in the selection of financial portfolios. Most preferably, when the mean variance relationship is applied, a commercial computer software application such as the "Wagner Associates Mean-Variance

Optimization Application", referred to as "Wagner Software" throughout this specification. This software uses functions from the "Wagner Associates Mean-Variance Optimization Library" to determine an efficient frontier and optimal portfolios in the Markowitz sense. Since such applications are made for financial applications, it may be necessary to preprocess input data so that it can conform to conventions required by the software. For example, when Wagner Software is employed in conjunction with microarray intensity measurements the following data transformation method is employed.

A relationship between each genes baseline and experimental value must first be established. The preferred process is conducted as follows. A baseline class is selected. Typically, this will comprise genes from a population that does not have the condition of interest. For example, if one were interested in selecting a portfolio of genes that are diagnostic for breast cancer, samples from patients without breast cancer can be used to make the baseline class. Once the baseline class is selected, the arithmetic mean and standard deviation is calculated for the indicator of gene expression of each gene for baseline class samples. This indicator is typically the fluorescent intensity of a microarray reading. The statistical data computed is then used to calculate a baseline value of (X*Standard Deviation + Mean) for each gene. This is the baseline reading for the gene from which all other samples will be compared. X is a stringency variable selected by the person formulating the portfolio. Higher values of X are more stringent than lower. Preferably, X is in the range of .5 to 3 with 2 to 3 being more preferred and 3 being most preferred.

Ratios between each experimental sample (those displaying the condition of interest) versus baseline readings are then calculated. The ratios are then transformed to base 10 logarithmic values for ease of data handling by the software. This enables down regulated genes to display negative values necessary for optimization according to the Markman mean-variance algorithm using the Wagner Software.

The preprocessed data comprising these transformed ratios are used as inputs in place of the asset return values that are normally used in the Wagner Software when it is used for financial analysis purposes.

Once an efficient frontier is formulated, an optimized portfolio is selected for a given input level (return) or variance that corresponds to a point on the frontier. These inputs or variances are the predetermined standards set by the person formulating the portfolio. Stated differently, one seeking the optimum portfolio determines an acceptable input level (indicative of sensitivity) or a given level of variance (indicative of specificity) and selects the genes that lie along the efficient frontier that correspond to that input level or variance. The Wagner Software can select such genes when an input level or variance is selected. It can also assign a weight to each gen

e in the portfolio as it would for a stock in a stock portfolio.

Determining whether a sample has the condition for which the portfolio is diagnostic can be conducted by comparing the expression of the genes in the portfolio for the patient sample with calculated values of differentially expressed genes used to establish the portfolio. Preferably, a portfolio value is first generated by summing the multiples of the intensity value of each gene in the portfolio by the weight

assigned to that gene in the portfolio selection process. A boundary value is then calculated by (Y*standard deviation + mean of the portfolio value for baseline groups) where Y is a stringency value having the same meaning as X described above. A sample having a portfolio value greater than the boundary value of the baseline class is then classified as having the condition. If desired, this process can be conducted iteratively in accordance with well known statistical methods for improving confidence levels.

Optionally one can reiterate this process until best prediction accuracy is obtained.

The process of portfolio selection and characterization of an unknown is summarized as follows:

1. 1. Choose baseline class.

2. 2. Calculate mean, and standard deviation of each gene for baseline class samples.

3. 3. Calculate (X*Standard Deviation + Mean) for each gene. This is the baseline reading from which all other samples will be compared. X is a stringency variable with higher values of X being more stringent than lower.

4. 4. Calculate ratio between each Experimental sample versus baseline reading calculated in step 3.

5. 5. Transform ratios such that ratios less than 1 are negative (eg.using Log base 10). (Down regulated genes now correctly have negative values necessary for MV optimization).

6. 6. These transformed ratios are used as inputs in place of the asset returns that are normally used in the software application.

7. 7. The software will plot the efficient frontier and return an optimized portfolio at any point along the efficient frontier.

8. 8. Choose a desired return or variance on the efficient frontier.

9. 9. Calculate the Portfolio's Value for each sample by summing the multiples of each gene's intensity value by the weight generated by the portfolio selection algorithm.

10. 10. Calculate a boundary value by adding the mean Portfolio Value for Baseline groups to the multiple of Y and the Standard Deviation of the Baseline's Portfolio Values. Values greater than this boundary value shall be classified as the Experimental Class.

11. 11. Optionally one can reiterate this process until best prediction accuracy is obtained.

A second portfolio can optionally be created by reversing the baseline and experimental calculation. This creates a new portfolio of genes which are up-regulated in the original baseline class. This second portfolio's value can be subtracted from the first to create a new classification value based on multiple portfolios.

Another useful method of pre-selecting genes from gene expression data so that it can be used as input for a process for selecting a portfolio is based on a threshold given by 1 <=) (mu t - mu n) sigma t + sigma n) , where .(micro). t)) is the mean of the subset known to possess the disease or condition, .(micro). n)) is the mean of the subset of normal samples, and sigma t)) + sigma n)) represent the combined standard deviations. A signal to noise cutoff can also be used by pre-selecting the data according to a relationship such as 0.5 <=) (mu t - MAX n) (sigma t + sigma n)) . This ensures that genes that are pre-selected based on their differential modulation are differentiated in a clinically significant way. That is, above the noise

level of instrumentation appropriate to the task of measuring the diagnostic parameters. For each marker pre-selected according to these criteria, a matrix is established in which columns represents samples, rows represent markers and each element is a normalized intensity measurement for the expression of that marker according to the relationship:) (mu t - I) mu t) where I is the intensity measurement.

Using this process of creating input for financial portfolio software make also allows one to set additional boundary conditions to define the optimal portfolios. For example, portfolio size can be limited to a fixed range or number of markers. This can be done either by making data pre-selection criteria more stringent (e.g, .8 <=) (mu t - MAX n) (sigma t + sigma n)) instead of 0.5 <=) (mu t - MAX n) (sigma t + sigma n))) or by using programming features such as restricting portfolio size. One could, for example, set the boundary condition that the efficient frontier is to be selected from among only the optimal 10 genes. One could also use all of the genes pre-selected for determining the efficient frontier and then limit the number of genes selected (e.g., no more than 10).

The process of selecting a portfolio can also include the application of heuristic rules. Preferably, such rules are formulated based on biology and an understanding of the technology used to produce clinical results. More preferably, they are applied to output from the optimization method. For example, the mean variance method of portfolio selection can be applied to microarray data for a number of genes differentially expressed in subjects with breast cancer. Output from the method would be an optimized set of genes that could include some genes that are expressed in peripheral blood as well as in diseased breast tissue. If sample used in the testing method are obtained from peripheral blood and certain genes differentially expressed in instances of breast cancer could also be differentially expressed in peripheral blood, then a heuristic rule can be applied in which a portfolio is selected from the efficient frontier excluding those that are differentially expressed in peripheral blood. Of course, the rule can be applied prior to the formation of the efficient frontier by, for example, applying the rule during data pre-selection.

Other heuristic rules can be applied that are not necessarily related to the biology in question. For example, one can apply the rule that only a given percentage of the portfolio can be represented by a particular gene or genes. Commercially available software such as the Wagner Software readily accommodates these types of heuristics. This can be useful, for example, when factors other than accuracy and precision (e.g., anticipated licensing fees) have an impact on the desirability of including one or more genes.

Other relationships aside from the mean-variance relationship can be used in the method of the invention provided that they optimize the portfolio according to predetermined attributes such as assay accuracy and precision. Two examples are the Martin simultaneous equation approach (Elton, Edwin J. and Martin J. Gruber (1987), Modern Portfolio Theory Investment Analysis, Third Edition, John Wiley, New York, 1987) and Genetic Algorithms (Davis, L., (1989), Adapting Operator Probabilities in Genetic Algorithms, in Proceedings of the Third International Conference on Genetic Algorithms, Morgan Kaufmann: San Mateo, pp. 61-69). There are also many ways to adapt the mean-variance relationship to handle skewed

data such as where a marker detection technology exhibits a known bias. These include, for example, the Semi-Deviation method in which the square root of the average squared (negative) deviation from a reference signal and includes only those signal values that fall below the reference signal.

Articles of this invention include representations of the gene expression profiles that make up the portfolios useful for treating, diagnosing, prognosticating, and otherwise assessing diseases. These representations are reduced to a medium that can be automatically read by a machine such as computer readable media (magnetic, optical, and the like). The articles can also include instructions for assessing the gene expression profiles in such media. For example, the articles may comprise a CD ROM having computer instructions for comparing gene expression profiles of the portfolios of genes described above. The articles may also have gene expression profiles digitally recorded therein so that they may be compared with gene expression data from patient samples. Alternatively, the profiles can be recorded in different representational format. A graphical recordation is one such format.

Different types of articles of manufacture according to the invention are media or formatted assays used to reveal gene expression profiles. These can comprise, for example, microarrays in which sequence complements or probes are affixed to a matrix to which the sequences indicative of the genes of interest combine creating a readable determinant of their presence. When such a microarray contains an optimized portfolio great savings in time, process steps, and resources are attained by minimizing the number of cDNA or oligonucleotides that must be applied to the substrate, reacted with the sample, read by an analyzer, processed for results, and (sometimes) verified.

Other articles according to the invention can be fashioned into reagent kits for conducting hybridization, amplification, and signal generation indicative of the level of expression of the genes in the portfolios established through the method of the invention. Kits made according to the invention include formatted assays for determining the gene expression profiles. These can include all or some of the materials needed to conduct the assays such as reagents and instructions.

EXAMPLES

Example 1: Producing an Optimized Portfolio

Gene expression data was recently produced from tissue samples representative of eleven different types of cancers. The data was published in Cancer Research 61: 7388-7393, 2001 and http://carrier.gnf.org/welsh/epican/. See, Andrew I. Su et al., "Molecular Classification of Human Carcinomas by Use of Gene Expression Signatures."The data included intensity measurements obtained with the use of an "U95"a oligonucleotide microarray (commercially available from Affymetrix, Inc.).

Measurements of the expression of genes from the published data (fluorescent intensity measurements) was used to select optimum gene expression portfolios for a panel of markers to determine whether a circulating cell is indicative of the presence of breast cancer, prostate cancer, ovarian cancer, colorectal cancer, or lung cancer. Such

circulating cells would preferably be epithelial cells.

The data in the study was collected from the following samples: 24 adenocarcinomas, 12 infilitrating ductal breast adenocarcenomas, 21 colorectal adenocarcinomas, 23 ovarian adenocarcinomas, 25 lung carcinomas, and data from the following additional samples: 19 prostate adenocarcinomas, 12 breast carinomas, 13 colon carcinomas, 13 ovarian carcinomas, 13 ovarian carcinomas, and 89 lung carcenomas.

Using intensity readings from a collection of normal samples as the baseline class, the arithmetic mean, and standard deviation of each gene were calculated followed by a calculation of the value (X*Standard Deviation + Mean) for each gene. The stringency variable, X, was assigned a value of 3 in this case. Ratios were then calculated between each Experimental sample described in the study versus the baseline value calculations. The ratios were transformed into common logarithms. These values were then used as the input values for the Wagner Software.

This procedure selected an efficient frontier along which a minimum set of markers for each tumor type that have the lowest amount of variation for a selected level of differential (chosen at the best signal to noise ratio point). Optimization by the software resulted in the selection of a portfolio of 24 genes including 2 for prostate cancer, 5 for breast cancer, 6 for colon cancer, 2 for ovarian cancer, and 9 for lung cancer markers (Table 1).

Example 2: Heuristic Step

A heuristic rule was further applied to the portfolio obtained in Example 1. That is, the rule stated that if the gene/marker identified would likely be expressed in peripheral blood or were well-characterized tissue markers (e.g. PSA, mammaglobin, etc.), then such genes/marker would be removed from the portfolio. Application of the rule enabled the establishment of a portfolio of genes/markers that are optimized for use in a screening application in which the patient sample is obtained by assaying components found in the peripheral blood such as epithelial cells. The result of the selected portfolio contains 31 genes as shown in Table 2.

Example 3: Prognostic Portfolios

A patient sample set with known clinical outcomes was used to test the portfolio selection method of the invention. The sample set is described in van't Veer, L. J et al . Gene Expression Profiling Predicts Clinical Outcome of Breast Cancer, Nature, 415, 530 - 536, (2002), incorporated herein by reference. In that study, breast tissue samples were obtained from 78 patients exhibiting sporadic breast tumors. The patients were all less than 55 years of age and presented with a tumor less than 5cm. All were lymph node negative. Thirty four of the patients presented with distant metastases in less than 5 years while 44 showed no distant metastases in the same period.

Sample preparation and expression profiling are described in the reference. A prognostic marker portfolio of 70 genes was selected from consideration of about 5,000 genes differentially expressed in patients with different prognoses (metastasis v. no metastasis). The selection was made based on unsupervised clustering followed by a correlation coefficient analysis. This was done by calculating the correlation coefficient of the expression of each gene with disease outcome. Those significantly associated with disease by this analysis were then rank

ordered with successive groups of five compared using the "leave-one-out" method until an "optimized" panel of 70 genes was selected.

The data from the study were then processed according to the method of the invention. Sample number 54 was removed from further analysis due to a high percentage of missing values. The mean and standard deviation of the intensity measurements for each gene were calculated using the non-metastatic samples as the baseline. A discriminating value of X*(Standard Deviation + Mean) was then calculated for each baseline gene (X was assigned a value of 3). This value was used to ensure the resulting portfolio would be stringent. A ratio of the discriminating value to the baseline value was then calculated for each metastatic sample. This ratio was then converted to a common logarithm. This data was then imported into Wagner Software which produced an efficient frontier from which a portfolio of 16 genes was selected. The baseline and experimental values were then reversed and a second portfolio of 12 markers representing genes up-regulated in the non-metastatic cases was produced. The second portfolio's value is subtracted from the first portfolios value to create a combined portfolio value from all 28 genes. This final portfolio is comprised of genes from Seq. ID No.70 -97. 17 of the genes of this portfolio were also present in the 70 gene portfolio described in the reference. The genes of the portfolio are identified below. (Seq. ID No. 70, Seq. ID No. 72, Seq. ID No. 73-77, Seq. ID No. 79, Seq. ID No. 80, Seq. ID No. 85, Seq. ID No. 87, Seq. ID No. 91-93, Seq. ID No. 95 and Seq. ID. No. 97.) 28 Gene list (2 Portfolios)

The two portfolios were then used to determine the prognosis of the 78 original samples by comparing gene expression signatures from the microarray data according to the method for testing the classification accuracy described in the reference. In the case of the 70 gene portfolio, 81 % of the samples were properly characterized according to an optimized threshold biased to include ambiguous signatures as indicative of poor prognosis (85% for an absolute threshold). This portfolio misclassified 3 patients with a poor prognosis as having a good prognosis using the optimized threshold (5 for the absolute threshold). Twelve patients with a good prognosis were misclassified as having a good prognosis when they had a bad prognosis using the optimized threshold (8 for absolute).

In the case of the 28 gene portfolio, 94% of the samples were properly characterized according to an optimized threshold biased to include ambiguous signatures as indicative of poor prognosis (93% for an absolute threshold). This portfolio misclassified 3 patients with a poor prognosis as having a good prognosis using the optimized threshold (5 for the absolute threshold). Three patients with a good prognosis were misclassified as having a good prognosis when they had a bad prognosis using the optimized threshold (2 for absolute).

Comparing the two profiles, it is apparent that the profiles selected according to the method of the invention are much more economical and produce results that are more accurate and reliable than those of the comparative portfolio.

Annex to the application documents - subsequently filed sequences listing

CLAIMS EP 1679382 A2

1. A method of diagnosing cancer comprising identifying differential modulation of each gene (relative to the expression of the same genes in a normal population) in a combination of genes selected from the group consisting of Seq. ID. No.32-67, Seq. ID No. 69, and Seq. ID No. 98-100.
2. The method of claim 1 wherein there is at least a 2 fold difference in the expression of the modulated genes.
3. The method of claim 1 wherein the p-value indicating differential modulation is less than .05.
4. A diagnostic portfolio comprising isolated nucleic acid sequences, their complements, or portions thereof of a combination of genes selected from the group consisting of Seq. ID. No. 32-67, Seq. ID No. 69, and Seq. ID No. 98-100.
5. The diagnostic portfolio of claim 4 in a matrix suitable for identifying the differential expression of the genes contained therein.
6. The diagnostic portfolio of claim 5 wherein said matrix is employed in a microarray.
7. The diagnostic portfolio of claim 6 wherein said microarray is a cDNA microarray.
8. The diagnostic portfolio of claim 7 wherein said microarray is an oligonucleotide microarray.
9. A kit for diagnosing cancer comprising reagents for the detection of the expression of genes selected from the group consisting of Seq. ID. No.32-67, Seq. ID No. 69, and Seq. ID No. 98-100.
10. The kit of claim 9 further comprising reagents for conducting a microarray analysis.
11. The kit of claim 9 further comprising a medium through which nucleic acid sequences within said genes, their compliments, or portions thereof are assayed.
12. The kit of claim 11 wherein said medium is a microarray.
13. The kit of claim 12 further comprising instructions.

4/19/2 (Item 2 from file: 348) **Links**
EUROPEAN PATENTS


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01888559
Colorectal cancer prognostics
Prognose von Kolorektalem Krebs
Pronostic de cancer colorectal
PATENT ASSIGNEE:
  Veridex LLC, (4846420), 1001 U.S. Highway 202, Raritan, NJ 08669, (US),
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PATENT (CC, No, Kind, Date):  EP 1526186  A2  050427 (Basic)
                              EP 1526186  A3  050817
APPLICATION (CC, No, Date):   EP 2004251933 040331;
PRIORITY (CC, No, Date): US 403449 030331
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR;
  HU; IE; IT; LI; LU; MC; NL; PL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK
INTERNATIONAL PATENT CLASS (V7): C12Q-001/68

ABSTRACT EP 1526186 A2
    A method of providing a prognosis of colorectal cancer is conducted by
  analyzing the expression of a group of genes. Gene expresson profiles in
  a variety of medium such as microarrays are included as are kits that
  contain them.
ABSTRACT WORD COUNT: 40
NOTE:
  Figure number on first page: NONE

LEGAL STATUS (Type, Pub Date, Kind, Text):
 Application:     050427 A2 Published application without search report
 Search Report:   050817 A3 Separate publication of the search report
 Change:          060329 A2 Title of invention (German) changed: 20060329
 Change:          060329 A2 Title of invention (English) changed: 20060329
 Change:          060329 A2 Title of invention (French) changed: 20060329
 Change:          060510 A2 Title of invention (German) changed: 20060510
 Change:          060510 A2 Title of invention (English) changed: 20060510
 Change:          060510 A2 Title of invention (French) changed: 20060510
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text  Language   Update    Word Count
      CLAIMS A  (English)  200517      579
      SPEC A    (English)  200517     6598
Total word count - document A         7177
Total word count - document B            0
Total word count - documents A + B    7177

SPECIFICATION EP 1526186 A2
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4/19/9 (Item 9 from file: 348) **Links**

01637631

Method of selecting a portfolio of markers for use in a diagnostic application

Verfahren zur Selektion eines Markerportfolios fur die diagnostische Anwendung

Methode pour la selection d'un ensemble des marqueurs pour une application diagnostique

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PATENT (CC, No, Kind, Date): EP 1349104 A2 031001 (Basic)
EP 1349104 A3 040102

APPLICATION (CC, No, Date): EP 2003252027 030331;

PRIORITY (CC, No, Date): US 368790 P 020329

DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR; HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR

EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO

INTERNATIONAL PATENT CLASS (V7): G06F-019/00

ABSTRACT EP 1349104 A2

Methods of selecting a portfolio of markers for use in a diagnostic applications include defining diagnostic parameters, establishing a relationship among the parameters so that they are optimized, and selecting an optimal group of markers for the diagnostic application. The diagnostic parameters can include a measure of the relative degree of expression of a gene, a measure of the variation in the measurement of the degree of expression of the gene, and the relationship between the diagnostic and discriminating parameters can be a mean variance relationship.

Machines programmed to conduct the method and articles that comprise instructions for their operation are further aspects of the invention.

ABSTRACT WORD COUNT: 107

LEGAL STATUS (Type, Pub Date, Kind, Text):

Application:	031001 A2	Published application without search report
Search Report:	040102 A3	Separate publication of the search report
Examination:	040811 A2	Date of request for examination: 20040609

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200340	318
SPEC A	(English)	200340	5086
Total word count - document A			5404
Total word count - document B			0
Total word count - documents A + B			5404

4/19/10 (Item 10 from file: 348) **Links**
EUROPEAN PATENTS

01320331
TOTAL ADVERTISEMENT MANAGING SYSTEM USING ADVERTISEMENT PORTFOLIO MODEL
WERBUNGVERWALTUNGSYSTEM DAS EIN WERBUNGPORTFOLIOMODELL VERWENDET
SYSTEME DE GESTION DE PUBLICITE UTILISANT UN MODELE DE PORTEFEUILLE DE PUBLICITES
PATENT ASSIGNEE:
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HIBIKI, Norio, C-1207, 3-20, Nakaarai, Tokorozawa-shi, Saitama 359-0041, (JP)
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PATENT (CC, No, Kind, Date): EP 1244036 A1 020925 (Basic)
WO 2001048646 010705
APPLICATION (CC, No, Date): EP 2000985917 001227; WO 2000JP9280 001227
PRIORITY (CC, No, Date): JP 99377367 991227
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS (V7): G06F-017/60
CITED PATENTS (WO A): XP 1006137 ; XP 1006141
CITED REFERENCES (WO A):
'Antecedents of risk-taking behavior by advertisers: Empirical evidence and management implications' JOURNAL OF ADVERTISING RESEARCH vol. 35, no. 5, 1997, pages 27 - 40, XP001006137
WEST D.C.: '360 degrees of creative risk' JOURNAL OF ADVERTISING RESEARCH vol. 39, no. 1, January 1999 - February 1999, pages 39 - 50, XP001006141;

ABSTRACT EP 1244036 A1
Provided is an advertisement portfolio model that can reduce a risk in an advertisement transaction for an individual advertisement product. Since in an advertisement portfolio model according to the present invention, firstly a relational expression to determine a comprehensive advertisement risk management index is derived, which is an index for statistically representing a maximum unexpected loss amount which the advertisement product is subject to at a certain probability during the advertising campaign period, secondarily a plurality of correlation coefficient data of the advertisement product are calculated from the observational data of the advertisement product, and thirdly an optimal combination of the advertisement products is figured out in order to analyze at least either one of an effect, an efficiency or a risk of the advertisement product based on the relational expression for determining the comprehensive advertisement risk management index and the plurality of correlation coefficient data or the observational data which has taken the correlation into account indirectly, thereby the present invention

can provide a sponsor with an optimal combination of the advertisement products.
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SPECIFICATION EP 1244036 A1

FIELD OF THE INVENTION

The present invention relates to an advertisement portfolio model, a comprehensive advertisement risk management system using the advertisement portfolio model, and a method for making an investment decision by using the advertisement portfolio model.

DESCRIPTION OF THE PRIOR ART

Conventionally, a sponsor has made a decision on purchasing an actual program based on the sponsor's advertising strategy together with fundamental conditions, including: an advertising budget; a period of an advertising campaign; an advertising amount; an advertising media to be used and an advertisement product; and an advertisement material and its media pattern, plus these conditions additionally taken into consideration, which will be of decision factors particular to the sponsor, including: a selection of advertising media to be used; a match of the advertisement product with a company image or an product image; a reference value in advertising efficiency acceptable by the sponsor (a calculation from an advertising cost and a variety of survey data such as an audience rating); a reaction rate of the consumers who have come in contact with the advertising media (a collect rate of a questionnaire or a document request, an product purchase rate, and so on); and a target value in the advertising efficiency set by the sponsor based on values in survey data (a reach and frequency, a rate of attention-getting, a rate of recognition and so on) determined statistically from a variety of sample surveys.

An optimal model relating to a purchasing of the advertisement product according to the prior art has been developed so as to provide an

advertising project by analyzing the individual statistical data specified to the advertising media, such as the audience rating and/or the subscription rating.

However, the optimal model relating to the purchasing of the advertisement product according to the prior art described above could not provide any advertising project tailored independently for each sponsor which may take a relationship between the advertisement product and the sponsor or evaluation parameters other than the items subject to statistical survey into an account.

Besides, the prior-art optimal model relating to the purchasing of the advertisement product has been developed to analyze a variety of statistical data by way of an ordinary sample survey such as the audience rating or the subscription rating, and due to this reason, it could not provide an evaluation measure and an evaluation criteria in the advertising efficiency specifically customized for the individual sponsor.

Further, in the prior art technology, since there has been no index to determine a risk for the purchasing of the advertisement product, it has inhibited any development in such an advertisement product that can reduce the risk in the advertisement transaction.

DISCLOSURE OF THE INVENTION

An object of the present invention, in the light of the problems associated with the prior art as described above, is to provide an advertisement portfolio model including an optimal combination of advertisement products.

The aforementioned object of the present invention may be achieved by an advertisement portfolio model, in which firstly a relational expression to determine a comprehensive advertisement risk management index is derived, which is an index for statistically representing a maximum unexpected loss amount which the advertisement product is subject to at a certain probability during the advertising campaign period, secondarily a plurality of correlation coefficient data of the advertisement product are calculated from an observational data of the advertisement product, and thirdly an optimal combination of the advertisement products is figured out in order to analyze at least either one of an effect, an efficiency or a risk of the advertisement product based on the relational expression for determining the comprehensive advertisement risk management index and the plurality of correlation coefficient data or the observational data which has taken the correlation into account indirectly.

In the advertisement portfolio model according to the present invention, the advertisement product may comprise at least two or more different advertisement products.

In the advertisement portfolio model according to the present invention, the advertisement product may be constructed to include at least one advertisement derivative product.

In the advertisement portfolio model according to the present invention, the advertisement derivative product may be constructed so as to measure a risk in an individual advertisement transaction and at the same time to reduce the risk in the individual advertisement transaction.

Further, another object of the present invention is to provide a comprehensive advertisement risk management system which allows a sponsor

to make a comprehensive investment decision by using the above-described advertisement portfolio on the advertisement product owned by the sponsor.

The aforementioned object of the present invention may be achieved by a comprehensive advertisement risk management system using an optimal advertisement portfolio model to analyze at least either one of an effect, an efficiency or a risk of an advertisement product, said system comprising: an input means for entering a setting condition required to calculate the comprehensive advertisement risk management index; a model generation means for generating a plurality of advertisement portfolio models by firstly calculating a plurality of numeric values relating to the advertising effect and the advertising efficiency from the observational data in the past according to the setting condition entered by the input means, and by secondarily calculating a plurality of correlation coefficient data for a purchased advertisement product from a data of said purchased advertisement product; a verification means for comparing a plurality of those generated advertisement portfolio models to actual data during a period of the advertisement product being offered and for verifying that said plurality of advertisement portfolio models is adaptable to the real condition; and a selection means for selecting a most suitable advertisement portfolio model with respect to the risk analysis and the effect analysis of the advertisement product from the plurality of advertisement portfolio models based on the verification result by the verification means.

In the comprehensive advertisement risk management system using the advertisement portfolio model according to the present invention, the advertisement product may comprise at least two or more different advertisement products.

In the comprehensive advertisement risk management system using the advertisement portfolio model according to the present invention, the advertisement product may be constructed to include at least one advertisement derivative product.

In the comprehensive advertisement risk management system using the advertisement portfolio model according to the present invention, the advertisement derivative product may be constructed so as to measure a risk in an individual advertisement transaction and at the same time to reduce the risk in the individual advertisement transaction.

In the comprehensive advertisement risk management system using the advertisement portfolio model according to the present invention, a plurality of numeric values relating to the advertising effect and the advertising efficiency may be represented by two or more values selected from a group consisting of values relating to an audience rating, a cost per mil (CPM), a reach, a frequency and a recognition.

Further, another object of the present invention is to provide an investment decision making method which allows a sponsor to make a comprehensive investment decision on an owned advertisement product by using the above-described advertisement portfolio model.

The aforementioned object of the present invention may be achieved by an investment decision making method using the advertisement portfolio model, comprising the steps of: entering a setting condition required to calculate the comprehensive advertisement risk management index; calculating a plurality of numeric values relating to the advertising effect and the advertising efficiency from the observational data in the past according to the setting condition entered by the input means;

calculating a plurality of correlation coefficient data for a purchased advertisement product from an advertisement product data of the purchased advertisement product; generating a plurality of advertisement portfolio models based on the calculation results; comparing a plurality of those generated advertisement portfolio models with actual data during a period of the purchased advertisement product being offered; verifying that the plurality of advertisement portfolio models is practically adaptable to the real condition based on the comparison result; and selecting a most suitable advertisement portfolio model with respect to the risk analysis and the effect analysis of the purchased advertisement product from the plurality of advertisement portfolio models based on the verification result.

In the investment decision making method using the advertisement portfolio model according to the present invention, the advertisement product may comprise at least two or more different advertisement products.

In the investment decision making method using the advertisement portfolio model according to the present invention, the advertisement product may be constructed to include at least one advertisement derivative product.

In the investment decision making method using the advertisement portfolio model according to the present invention, the advertisement derivative product may be constructed so as to measure a risk in an individual advertisement transaction and at the same time to reduce the risk in the individual advertisement transaction.

In the investment decision making method using the advertisement portfolio model according to the present invention, a plurality of numeric values relating to the advertising effect and the advertising efficiency may be represented by two or more values selected from a group consisting of values relating to an audience rating, a cost per mil (CPM), a reach, a frequency and a recognition.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram illustrating a configuration of a comprehensive advertisement risk management system of an embodiment according to the present invention;

Fig. 2 is a chart illustrating an example of a verification result data by the comprehensive advertisement risk management system of Fig. 1;

Fig. 3(a) is a flow chart for illustrating a processing operation of the comprehensive advertisement risk management system of Fig. 1;

Fig. 3(b) is a flow chart for illustrating a processing operation of the comprehensive advertisement risk management system of Fig. 1;

Fig. 3(c) is a flow chart for illustrating a processing operation of the comprehensive advertisement risk management system of Fig. 1;

Fig. 4(a) shows an exemplary set of terms to be entered from a user purchasing condition input section of the comprehensive advertisement risk management system of Fig. 1;

Fig. 4(b) shows an exemplary set of terms to be entered from a user purchasing condition input section of the comprehensive advertisement risk management system of Fig. 1;

Fig. 4(c) shows an exemplary set of terms to be entered from a user

purchasing condition input section of the comprehensive advertisement risk management system of Fig. 1;

Fig. 5 shows an exemplary set of terms to be entered from a user purchasing condition input section of the comprehensive advertisement risk management system of Fig. 1;

Fig. 6 is a graph illustrating AR index values and actual loss and gain amounts in time sequence for each model generated by the comprehensive advertisement risk management system of Fig. 1; and

Fig. 7 is a table of the verification result data of Fig. 2 that has been ordered and compiled, wherein the data is indicated according to the optimal advertisement portfolio model ranking.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will now be described below with reference to the attached drawings.

Fig. 1 is a block diagram, illustrating a schematic configuration of a comprehensive advertisement risk management system of a preferred embodiment according to the present invention.

A user purchasing condition input section 10 is constructed so that a sponsor, a purchaser of an advertisement product, can select a quantitative and qualitative evaluation measure such as an effect and/or an efficiency of the advertisement product from the setting conditions, and can input a user purchasing condition 11 indicating data which are weighted corresponding to a degree of the terms to which the sponsor wish to attach weight with respect to said selected evaluation measure.

An advertisement product data storage section 20 stores program data 21, organization data 22, sales data 23, program evaluation data 24 and advertising effect data 25. The program data 21 indicates a title of a program, a genre of the program, a content of the program, casts, a producing production and so on. The organization data 22 indicates a broadcasting date of the program, a broadcasting hour of the program and so on. The sale data 23 indicates the number of sales days (the number of actual working days), a CM broadcasting date, a CM broadcasting hour, a total CM seconds, a no CM seconds, a cosponsor list and a sales restricted business category (a competitive business category), an advertising campaign period and a sales restriction condition (unit selling by a day of week, by a belt, by a spot; 60-seconds offer only, 30-seconds offer only; or billboard display only and so on), an advertising rate per unit CM seconds, and so on. The program evaluation data 24 is an evaluation data measured on a program or a CM material, which represents rating data determined through a survey to the sponsor and the audiences according to a specified evaluation measure (for example, a certain program or a CM material may be evaluated by requesting the answerer to give their evaluations against a question about the contents of the program or CM material "whether or not the program has any social meaning such as an environmental issue" through five different ranking levels, and thereby giving that subject scores matching to the evaluation). The advertisement effect data 25 indicates a statistical data for an audience rating, such as a reach, frequency and so on calculated from individual indicating data of the audience rating monitors.

A program combination processing section 30 generates "an advertisement portfolio" (described later in detail) representing a combination of the advertisement products, within the limited range of conditions specified

or entered by the user through the user purchasing condition input section 10, namely, the user purchasing condition 11, based on each set of data of the program data 21, the organization data 22, the sales data 23, the program evaluation data 24 and the advertising effect data 25, each stored in the advertisement product data storage section 20.

A market data storage section 40 stores market data 41 representing market data (e.g., CPM calculated from the past audience rating data and the advertising rate per unit CM seconds for the advertisement product used on the TV broadcast) required to calculate "a comprehensive advertisement risk management index", or an AR (Advertisement Risk measure)(described later in detail; hereafter referred to as an AR index, if appropriate).

An owned advertisement product data storage section 50 stores owned advertisement product data 51 representing data for the advertisement products owned by the sponsor, including advertisement derivative products such as futures, options and swaps. The owned advertisement product data 51 has, for example, for the case of providing the sponsored program, a variety of contents (e.g., a contracted date: 99/02/20, a division: time spot, a category: regular, a period: 6 months, a division of TV station: TBS, a broadcast start date: 99/04/05, a broadcast end date: 99/09/25, a broadcast start time: 21:00, a broadcast end time: 21:54, a division of the offered seconds: 60 seconds, a division of the sponsor display: yes, a division of purchase or sale: purchase, an offered seconds: 120 seconds, a contracted price: 40 million yen).

A user setting condition input section 60 is used for a user such as a sponsor to enter the conditional terms, which will be set upon calculating the AR index, and the section 60 is designed so that the user can enter 1.) an AR index calculation period covered and a data observation period, 2.) a data complementing method, 3.) with or without eliminating of a outlier/trend, 4.) a method for calculating volatility/correlation coefficient, and 5.) a method for measuring sensitivity, respectively. It is to be noted that if the user does not perform the user setting condition entry, that is, the user does not set any conditional terms, the system use a set of conditions given as a default.

Returning back to Fig. 1, the explanation will be continued.

An AR index calculation processing section 70 receives the data entered respectively from the market data storage section 40, the owned advertisement product data storage section 50, and the user setting condition input section 60, and outputs, based on the data covering all the program combinations selected in the program combination processing section 30, an AR index data 71 indicating a value (e.g., 26,852,350 yen) statistically which represents a maximum unexpected loss amount occurring in the value of the advertisement products owned by the sponsor including the advertisement derivative products such as futures or options at a certain probability during a holding period of the advertisement products.

An AR index data storage section 80 stores the AR index data 71 (e.g., 26,852,350 yen) from said AR index calculation processing section 70, said AR index data 71 indicating statistically the maximum unexpected loss amount occurring in the value of the advertisement products owned by the sponsor including the advertisement derivative products at the

certain probability during the holding period of the advertisement products.

An actual loss and gain data storage section 90 stores actual loss and gain data 91 representing the data for an actual loss and gain amount (e.g., 25,782,540 yen) occurringby selling and buying the advertisement products owned by or to be owned by the sponsor including the advertisement derivative products. The actual loss and gain data 91 is calculated by firstly determining a difference between the variety of survey data such as audience rating which the sponsor had used as an index upon purchasing the advertisement product and the data observed actually at the point when a broadcasting has been finished, and by secondarily calculating the actual loss and gain in the value of advertisement product owned by the sponsor yielded by this difference between the expected data (at the point of making a contract) and the actual data (at the time of broadcasting having been finished). That is, the actual loss and gain data 91 is obtained by firstly determining a difference between the variety of survey data such as the audience rating which the sponsor had used as the index upon purchasing the advertisement product and the data observed actually at the point when a broadcasting has been finished, and by secondarily calculating the actual loss and gain yielded by this determined difference in the value of the sponsor owned advertisement products.

A comparative verification processing section 100 receives the actual loss and gain data 91 stored in the actual loss and gain data storage section 90 and the AR index data 81 stored in said AR index data storage section 80, performs the comparative verification by using "a relationship between the comprehensive advertisement risk management index and the advertisement portfolio theory" (which will be described later in detail), and, based on the result from the comparative verification, outputs verification result data 101 indicating the measured number of times of the events that the value of the actual loss and gain data exceeds all of the values of the AR index data 81 determined in the manner described above.

A verification result data storage section 110 stores the verification result data 101 output from said comparative verification processing section 100.

As shown in Fig. 2, said verification result data 101 comprises: a portfolio model 102 (1(circle), 2(circle), 3(circle)...) for the program purchasing determined from the user purchasing condition; a setting condition 103 by the user for the AR index model subject to the verification; an AR index value 104 during an AR index calculation period; a number of count days 105 during said AR index calculation period; an actual loss and gain 106; the number of the AR index excess times 107; and an optimal model ranking 108. Those will be described later in detail.

An operation of the system of Fig. 1 will now be explained with reference to the flow diagrams of Figs. 3 (a) to (c).

The above-described user purchasing condition 11 is entered from the user purchasing condition input section 10 of Fig. 1 (step S1), and respective sets of data including said program data 21, said organization data 22, said sales data 23, said program evaluation data 24 and said advertisement effect data 25 are stored in the advertisement product data storage section 20 (step S2).

Then, within the range of said user purchasing condition 11 entered

from said user purchasing condition input section 10 and based on the respective sets of data including said program data 21, said organization data 22, said sales data 23, said program evaluation data 24 and said advertisement effect data 25, each stored in said advertisement product data storage section 20, the advertisement product combination processing section 30 of Fig. 1 generates an advertisement portfolio (step S3).

Further, said market data 41 is stored in the market data storage section 40 of Fig. 1 (step S4), said owned advertisement product data 51 is stored in the owned advertisement product data storage section 50 (step S5), and said user setting condition input 61 is entered from the user setting condition input section 60 of Fig. 1 (step S6).

It should be noted that in the steps S1 and S6, if it is determined that the input of said user purchasing condition 11 and/or said user setting condition 61 have not been performed by the user, the condition given as the default is entered (step S7).

Subsequently, the respective sets of data from the market data storage section 40, the owned advertisement product data storage section 50 and the user setting condition input section 60 are entered to the AR index calculation processing section 70 (step S8), and the AR index calculation processing section 70 of Fig. 1, based on said advertisement portfolio generated in the advertisement product combination processing section 30 of Fig. 1, calculates and then outputs said AR index data 71 indicating statistically the maximum unexpected loss amount to be incurred in the value of the advertisement product owned by the sponsor including the advertisement derivative product at a certain probability during the holding period (step S9).

Further, said AR index data 71 output from said AR index calculation processing section 70 is stored in the AR index data storage section 80 of Fig. 1 (step S10), and the difference between the variety of survey data such as audience rating which had been used as an index by the sponsor upon purchasing the advertisement product and the observational data observed actually at the point when the broadcasting has been finished is determined, and based on the loss and gain brought to the value of the advertisement product by the determined difference, the real actual loss and gain data 91 to be produced when the sponsor sells or buys the owned advertisement product is calculated (Step S11), and then the calculated loss and gain data 91 is stored in the actual loss and gain data storage section 90 of Fig. 1(step S12).

Subsequently, said actual loss and gain data 91 stored in the actual loss and gain data storage section 90 of Fig. 1 and said AR index data 81 stored in the AR index data storage section 80 of Fig. 1 are input into the comparative verification processing section 100 of Fig. 1 (step S13), and the comparative verification processing section 100 uses the relationship between the comprehensive advertisement risk management index and the advertisement portfolio theory, as will be described later, so as to perform the comparative verification (step S14).

Based on the result from the comparative verification by said comparative verification processing section 100, the times of events that the value of the actual loss and gain data exceeds all of the values of the AR index data 81 determined in the manner described above is counted (step S15), and then the counted result is outputted and indicated as the verification result data 101 (step S16).

Then, said verification result data 101 outputted from said comparative

verification processing section 100 is stored in the verification result data storage section 110 of Fig. 1 (step S17).

A detailed description for respective operations described above will be shown below.

At first, a user enters via the user purchasing condition input section 10 of Fig. 1 the respective terms of the user purchasing condition 11 as designated below:

11-1. Advertising budget
11-2. Period of purchasing
11-3. Area specified
11-4. Broadcasting hour specification
11-5. Program genre specification
11-6. Excluding genre specification
11-7. Program division specification
11-8. CPM restriction
11-9. Family audience rating restriction
11-10. Individual audience rating restriction
11-11. Target total GRP
11-12. CM material type
11-13. Contracted personality
11-14. Program evaluation reference point

Above-described user purchasing condition is necessary to retrieve a plurality of advertisement products matching to the user purchasing condition from the advertisement product data storage section 20 and to make a list of those advertisement products arranged in order according to their ranking in the evaluation criteria, with an aid of the information entered into the system, which indicates what reference is used by the sponsor upon purchasing an advertisement product to evaluate the value of the advertisement product and make a decision on the purchase.

Above-described advertising budget indicates an upper limit of the amount allowed to be invested by the sponsor for purchasing the advertisement product during a certain period, which may be specified as, for example, 1.75 billion yen as shown in Fig. 4(a).

Above-described period of purchasing means a term, to which said advertising budget may be applied, and may be specified as, for example, October 5, 2001 to March 25, 2002, as shown in Fig. 4(a).

Above-described area specification is one of the conditions for specifying an attribute of the advertisement product, which specifies a specific area, for example, Kanto block, Kansai block or Chubu block, as shown in Fig. 4 (a), where the sponsor wants to purchase the introduced advertisement product.

Above-described broadcasting hour specification and the time rank specification are used to specify the broadcasting hour or the time rank for the advertisement product which the user wants to buy by, for example,(1) specifying the period in the range of 9:00(tilde)23:30, excluding the range of 16:00(tilde)17:30, or (2) specifying the share "h" for the number of volumes of the advertising exposure or the share "s" for the advertising budget by way of indicating an allocation of 20% for A rank time, 25% for Special B rank time, 25% for B rank time and 30% for C rank time. On the purpose of the present invention, the time rank means a base rate for a broadcasting service determined by each broadcasting business company, typically defined hourly as an A time rank, a Special B time rank, a B time rank and a C time rank, wherein the base rate has

been individually determined for each of those time ranks.

Above-described program genre specification and the excluding genre specification are the terms used to specify the conditions indicating what genre of the contents of the advertisement product to be purchased or not to be purchased, which may be specified as, for example, drama/sport/news to be purchased and animation to be excluded, as shown in Fig. 4(a).

Above-described program division specification is the term to specify the division of organization for the program to be purchased, and may be specified by selecting the box program of No. 3 among the belt program:1, the telecommunication program:2, the box program:3, the special program:4, the infomercial:5 and the mail-order:6, as shown in Fig. 4(a).

Above-described CPM restriction and multiplying rate restriction may be determined by specifying the criteria for determining the cost upon purchasing as (1) applying the CPM, (2) applying the multiplying rate (=buying rate/base rate), or (3) applying the A time rank CPM per unit, and then by designating a specific numeric value for the upper limit such as the CPM of 750 yen or lower, the multiplying rate of 25% or lower and so on, as shown in Fig. 4(a).

Above-described family audience rating restriction and the individual audience rating restriction designate the lower limits for the target average audience rating to be referred upon purchasing and may be specified as, for example, 10.5% for the family audience rating and 8.5% and higher for the M1/F1 in the hierarchical specification, as shown in Fig. 4 (a). It is to be noted that the CPM (Cost Per Mille) designates the advertising achievement cost per 1,000 families or 1,000 people, and there is an equivalent term, CPT (Cost Per Thousand).

Above-described target total GRP is a cumulative total audience rating for a plurality of programs purchased in said period of purchasing, and may be specified as, for example, 20,000% or higher, as shown in Fig. 4(a).

Above-described CM material type and the contracted personality are necessary items to evaluate the correlation between the program to be purchased and the contents of the advertisement material and the contracted personality and thus to extract automatically a program of higher correlation from the advertisement product data storage section 20 by entering the contents of the CM used as the advertisement material and the contracted personality, and they may be specified by entering, for example, a specific seconds and/or type of the CM material for the advertisement material and a specific personality. As for the advertisement material type, it should have been entered beforehand in the same format as that of the program evaluation criteria, which will be explained later, so that the correlation with the program data 21 can be calculated.

Above-described program evaluation reference point is, as shown in Fig. 4 (b) and Fig. 4(c), the information to be used upon purchasing a program as an index for making a decision based on its rating information which is provided by the sponsor or a specific audience by evaluating the contents of the program including detailed contents thereof, which cannot be covered only by the program genre, by way of a 2-level or 5-level evaluation in advance and thereby determining the rating of the contents for each program. This information is to facilitate the purchasing of the advertisement product based on the own evaluation data of sponsor or

audience for the program, and thus, by quantifying the qualitative program contents, to allow the advertisement product to be purchased with the quantitative condition being taken into consideration.

Herein, the process will return to the description of the operation again.

In this next stage, the user inputs from the user setting condition input section 60 of Fig. 1 each of those terms in the user setting condition input 61 as shown below:

61-0. AR index calculation period
61-1. Data observation period
61-2. Smoothing method of data
61-3. With or without elimination of a outlier/trend
61-4. Calculating method of volatility/correlation coefficient
61-5. Measuring method of sensitivity

As for a specific example for each of these terms described above, as shown in Fig. 5, the AR index calculation period of "April 5, 1998 to September 25, 1998" and the data observation period of "April 5, 1997 to September 25, 1998" are respectively set (step S102), and then the smoothing method of data is selected from a group consisting of (1) no smoothing, (2) a linear smoothing and (3) a spline smoothing (the linear smoothing has been exemplarily selected in this embodiment). Then, the term of with or without elimination of a outlier/trend (outlier elimination) is selected from a group consisting of (1) eliminating (with) and (2) not-eliminating (without) (the (2) "without" has been exemplarily selected in this embodiment); the term of calculating method of volatility/correlation coefficient is selected from a group consisting of, for example, (1) daily (2) 10-day interval, (3) 20-day interval and (4) 30-day interval (the (1) daily has been exemplarily selected in this embodiment); and further the term of measuring method of sensitivity is selected from a group consisting of (1) +1bp (1bp=0.01%), (2) -1bp and (3) an average of absolute value of difference between (1) and (2) (the (1) +1bp has been selected exemplarily in this embodiment).

The system has been programmed such that, if there are any terms to which the user has gave no selection, the user purchasing condition input section 10 and/or the user setting condition input section 60 may employ a condition that has been set in advance (a default condition) as the user purchase entry 11 and/or the user setting condition entry 61. It is to be noted that the selection of the setting condition would not cause any change in the mode of the input data and the output data, and therefore the selection of the setting condition could not affect the overall process flow.

Then, a plurality of AR indexes is calculated for all of the possible combinations according to the selected parameters and methods, as will be explained below.

As will be described later, from the definition of the AR index, in which a maximum unexpected loss amount of the C

PM under the condition of

a certain confidence interval possibly caused by the advertisement product being exhibited below an expected value is defined as a "comprehensive advertisement risk management index" AR (Advertisement Risk measure), if a standard deviation in the audience rating for a certain program is denoted as " (sigma) " and a cumulative distribution function to a random variable "x" according to a normal distribution is

denoted as N(x), then a audience rating R (alpha) is calculated as follows: and, accordingly,

Herein, the confidence interval designates an interval in which an actual audience rating falls at a certain probability. For example, taking as an example an advertisement product having the expected audience rating of 10% and the standard deviation of 20%, if the audience rating is in the normal distribution, then at the probability of 95%, the actual audience rating may fall in a interval of +/-2 sigma (standard deviation), i.e., in a interval of from 10%-2x20% = -30% to 10%+2x20% = +50%. In other words, for the confidence interval of 95%, the lower limit should be -30% and the upper limit +50%.

To calculate the AR index for overall "advertisement portfolio" y=(y1)),...,yn))) (which will be described in detail later) according to the present invention, assuming that the standard deviation in the audience rating for a program "Sj))" is denoted as "(sigma)j))" and the cumulative distribution function to the random variable "x" (=audience rating) according to the normal distribution is denoted as N(x), then an audience rating averaged over the whole advertisement portfolio Rp)) is calculated as follows:

The variance for the overall advertisement portfolio, (sigma)p)), is determined as follows: (wherein, (sigma)jk)) is a covariance of an audience rating of advertisement product j and that of another advertisement product k.)

From the definition of the correlation coefficient, assuming that the correlation coefficient for the advertisement products jand k is denoted as (rho) jk)), the following relational expression can be defined: wherein, from said definition of the AR, representing as R(alpha) = Rp)), (sigma) = (sigma)p)), then the AR index for the overall portfolio, ARp)), is expressed as follows:

It is apparent from the above expression that minimizing of the AR index for the overall advertisement portfolio, ARp)), is equivalent to minimizing of the variance for the overall advertisement portfolio, (sigma)p)), and thus determining of the most suitable advertisement portfolio y=(y1)),...,yn))) is equivalent to solving for the following relational expression:

Reviewing the preceding, to determine the optimal portfolio, the averaged audience rating Rj)). for the advertisement product j having the parameter yj)) as shown in said equation (*) is used as the observational data, while the yj)) which can minimize said expression (* *) (sigma)p)) = (SIGMA)(SIGMA)yj))yk))(sigma)jk)) should be determined under the condition constrained by said expressions (2) to (4).

As obvious from said equation (1), in order to determine the optimal advertisement portfolio, it is necessary to calculate the covariance (sigma)jk)) for the advertisement product j and the other advertisement product k.

At first, the conditional terms for the advertisement product desired by the sponsor are input from the user purchasing condition input section 10, secondarily programs that meet the conditions are retrieved from the advertisement product data 26 consisting of the program data 21, the organization data 22, the sales data 23, the program evaluation data 24 and the advertising effect data 25, which have been stored in the advertisement product data storage section 20, and lastly the program combination processing section 30 generates a plurality of portfolio models by combining a plurality of programs matching to said conditions.

In this regard, for the plurality of programs satisfying said conditions, the outlier should be eliminated from the observational data (the audience rating data for an advertisement on television) stored in the market data storage section 40. There may be possibly a variety of errors existing or included in the actual data, and a part of those errors may indicate the value departing from the essential data value due to some reason. In the statistics, it has been said that when the data is examined in an exploring manner, preferably the affection from such outlier should be blocked so as to be minimized In this embodiment, the data existing at a distance of the standard deviation multiplied by a certain integer from the average value is considered as the outlier, and the observational data is corrected such that the data should not include said outlier. That is to say, the process determines whether or not a outlier should be eliminated, and if it is determined that the outlier should be eliminated, then the process eliminates from the observational data such outlier that is detected under said condition (i.e., the condition defining that the outlier is the existing at a distance of the standard deviation multiplied by a certain integer from the average value). The AR index calculation section 70 uses above expression (***) to calculate the volatility data (the standard deviation (sigma)j)), (sigma)k))) with the data after having been applied with the data smoothing operation. Further, the AR index calculation section 70 calculates the correlation coefficient data (the correlation coefficient (rho)jk)) of the advertisement product j and the advertisement product k) from the volatility data. Thereby, the covariance (sigma)jk)) of the advertisement product j and the advertisement product k can be calculated.

On the purpose of this specification, the term of volatility is used as the risk measure, which means the probability that an expected rate of return falls in an expectation, and it may be represented as a standard deviation. A higher volatility implies higher probability that the expected rate of return falls out of the expectation by a great degree. Further, the expected rate of return is defined as a sum of numeric values determined by all of the possible rates of return multiplied respectively by the probability of occurrence.

The manner for calculating the volatility (the standard deviation) and/or the correlation coefficient from the observational data uses the same formula as that used to calculate the standard deviation and/or the correlation coefficient from the population.

On the other hand, based on the owned advertisement product data, a market value data of the owned advertisement product is detected from the market data storage section 40, and based on said detected market value data, the sensitivity data is calculated.

The sensitivity data is the data relating to the risk factor used to see how much the market value may vary with respect to a change in the associated underlying product value or market index.

Said risk measure may include, the correlation, beta, delta((DELTA)), gamma ((gamma)), theta ((theta)), vega ((nu)), rho ((rho)) and basis. All of the advertisement products including the derivatives share those risk measures, and integrating and managing of those risk measures enables the comprehensive risk management for the advertisement portfolio containing a variety of advertisement products therein. Because of this, the sensitivity data calculation should be very important.

Then, based on above-described volatility data, the correlation

coefficient data and the sensitivity data, the AR index data is calculated individually for (1) all of the advertisement portfolios generated in the program combination processing section 30 and (2) the advertisement portfolio for the advertisement product owned by the sponsor at the current time, and subsequently based on the AR index conversion value data which can be calculated from all of the calculated AR index data and the actual loss and gain data, such a table as shown in previously referred Fig. 2 is generated.

Herein, to explain the AR index conversion value data of Fig. 2, the actual loss and gain data (e.g., the figure of 598,652 indicated as corresponding to the row of 1998/4/5) is the real data of the actual loss and gain which may occur by selling or buying the advertisement product owned by the sponsor, including the advertisement derivative products such as futures, options and swaps, and the actual loss and gain may be calculated by firstly determining a difference between a variety of survey data, such as audience rating, which was used as an index when the sponsor purchased the advertisement products, and an actually observed data at the end of the broadcasting of the advertisement product, and secondarily by calculating the actual loss and gain to be brought to the sponsor based on the difference between the estimated data (at the point of making a contract) and the actual data (at the end point of the broadcasting of the advertisement product). Accordingly, the AR index conversion value data is a form of data indicating the actual loss and gain data converted into the CPM.

Then, the comparative verification processing section 100 uses "the relationship between the comprehensive advertisement risk management index and the advertisement portfolio theory" according to the present invention to performs the comparative verification between all of the AR index values and the AR index conversion values for above-described portfolios (1) and (2), thus measures the number of the events that the AR index conversion value in the actual loss and gain data exceeds the values in the AR index data, and establishes the models according to the optimal model ranking, where the model having a smaller number of excess events is considered to be much closer to the optimal model.

Fig. 6 shows a time series graph for each of said generated models (the days are the horizontal axis, and the AR index values and the AR index conversion values for the actual loss and gain are the vertical axis). The values of the AR index should be represented by negative values since they are representing the maximum unexpected loss amounts. The number of events that the values of the AR index exceed the AR index conversion values for the actual loss and gain has been counted as the excess times.

Fig. 7 is a table generated by organizing and editing the verification result table of Fig. 2, and the models therein are indicated according to the possibly optimal model ranking. Comparing of the setting conditions allows to examine the trend of each of the selection methods.

Now, each of the aforementioned risk measures will be described in brief. The delta ((DELTA)) denotes a sensitivity of "market price (present value)" with respect to a price change in the associated market index (underlying product) for the derivative product. The gamma ((gamma)) denotes a sensitivity of the delta itself with respect to a change in the market index. The theta ((theta)) denotes a sensitivity of "the market price" with respect to a decrease in time. The vega ((nu)) denotes a sensitivity of "the market price" with respect to the

volatility. The rho ((rho)) is a sensitivity of "the market price" with respect to a change in an interest rate(a discount factor). The basis would be necessary when two underlying products exhibiting different changes in price have to be managed by using the risk index system for either one of them, and there should be needed some weight for integrating the price change for the other into that for the one. This weight should be referred to as the basis, which can be determined with the correlation coefficient from the historical data.

Now, a role of the sensitivity data in the risk management of the advertisement portfolio will be explained in more detail by illustratively describing the correlation and the beta taken as the examples of said risk measures.

In general, if n sets of data ((X1)),Y1))), (X2)),Y2))),..., (Xn)),Yn)))) are observed and those sets of data are used to estimate (alpha) and (beta) in the expression y = (alpha) + (beta) x+e, it is assumed that said n sets of data satisfy y = (alpha) + (beta) x+e, and then; where, using an estimation expression denoted as y(sup AND)=(alpha)(sup AND)+(beta)(sup AND)x, and the value of x being xj)), then the estimated value y(sup AND)j)) satisfies,

Defining a difference between the observed value yj)) and the estimated value y(sup AND)j)) as "a residual", the residual ej)) for the observed value (xj)), yj))) is expressed as:

Herein, using the least square method for specifyng the (alpha)(sup AND) and (beta)(sup AND) so as to minimize the square sum of the residual ej)) between the observed value yj)) and the estimated value y(sup AND)j)), then;

Herein, in order to minimize the function of said two variables (alpha)(sup AND) and (beta)(sup AND), the process is only required to set the partial derivatives with respect to such variables (alpha)(sup AND) and (beta)(sup AND) equal to zero, and accordingly; where,

Giving a solution to the above expression (16); where,

That is, under the assumption that the relational expression of the n sets of data ((X1)),Y1))), (X2)),Y2))),..., (Xn)),Yn)))) is represented by a certain linear function of xj)) and yj)), an intercept and a slope of the linear function can be determined in the manner as described above. Upon determination, it is an important matter that, as denoted in the expression (17), the (beta) value can be estimated by a covariance of x and y, (sigma)xy)).

Now, consider the case where return data generated by a single regression model as described above is used to an advertisement portfolio model.

Herein, it is assumed that n kinds of advertisement product Sj)) (j=1, 2, ..., n) exist in an advertisement market, and a return of the market index for a certain advertisement product is denoted as Rm)). Then, assuming that (beta)j)) is an expected rate of change (sensitivity index) of the return Rj)) for the advertisement product Sj)) to a change in Rm)); (alpha)j)) is an expected value of an individual return for the advertisement product Sj)) independently from this advertisement market; and ej)) is a random term (error) of the individual return for the advertisement product Sj)) independently from this advertisement market, then there will be derived from the relationship of above-described single regression model such an equation as:

To describe the relationship between the expected value E(x) and the

variance V(x) in conjunction with the ej)) and Rm)), the following relational expressions may be derived from the definitional equations of the expected value and the variance (see Fig. A).

From the above relational expressions, the return of the advertisement product Sj)) may be described by using two separate terms including the return (alpha)j)) unique to the advertisement product Sj)) and the return (beta)j))Rm)) in association with the market. That is expressed as:

Further, the variance of the advertisement product Sj)) may be described by using two separate terms including the risk (sigma) ej))2) unique to the advertisement product Sj)) and the risk (beta)j))2) (sigma)m))2) in association with the market. That is expressed as:

Further, it may be described as the covariance depending only on the market risk. That is expressed as:

From the above examination, the return of the advertisement product Sj)) may be described by using separate terms including the return ((alpha)j))) unique to the advertisement product Sj)) and the return ((beta)j))Rm))) in association with the market, and also the variance (risk) of the advertisement product Sj)) may be described by using separate terms including the risk ((sigma) ej))2)) unique to the advertisement product Sj)) and the risk ((beta)j))2) (sigma)j))2)) in association with the market. Further, the covariance ((sigma)ij))) may be described to be dependent only on the market risk ((beta)j))(beta)j))(sigma)2m). Defining those models as a single index model in the advertisement market, for the advertisement portfolio, the following relationship may be established:

for the return of the advertisement portfolio: and

for the variance:

Introducing of above-described single index model can reduce the number of parameters to be estimated to 3n+2, ((alpha)i)),(beta)i)),(sigma)ei)),Rm))(sigma)2m) from n(n+3)/2, (Ri)),(sigma)ij)) or Ri)),(sigma)j)),(rho)ij))) for the average/variance models, and thus can greatly reduce the volume of the calculation required to analyze the portfolio.

The most significant feature of the market model described above can be observed in that the correlations seen among the respective advertisement products has been replaced with the relationships between the market and the respective advertisement products, wherein, for example, the total of n pieces of regression models maybe considered for n pieces of advertisement products, with an assumption that the term of error for each different regression model has no correlation with one another. Accordingly, since it has been assumed that the associatively changing characteristics observed among the respective advertisement products can be totally explained with the relationship through the entire market, therefore the load of the calculation required for the analysis can be reduced greatly. Further, since it has been assumed that the error term for the regression model of each of the advertisement products is in the normal distribution with the expected value of zero and the constant variance, and is independent from one another, and also has no correlation with Rm)), therefore the following relational expression may be established;

Herein, the (alpha)p)) and (beta)p)) in the advertisement portfolio models are expressed as: and, the return Rp)) of the advertisement

portfolio is expressed as:
In this regard, if (alpha)p)) =0 and (beta)p))=1, then Rp))= Rm)), resulting in the return of the advertisement portfolio "P" identical with that of the market portfolio.
Accordingly, it may be evaluated that;
*(beta)p))>1: the advertisement portfolio P is more risky than the market, and
**(beta)p))<1: the advertisement portfolio P is less risky than the market.
Herein, assuming for the variance of the portfolio in the expression (#) as xi))=1/n, then: and, as is obvious, when the n is getting greater, the average residual risk of said second term is getting smaller.
From the above examination, by using the relational expression of (sigma) i)) 2)= (beta) i)) 2) (sigma) m))2)+ (sigma)ei)) 2) as the risk in each of the advertisement products, the risk can be categorized into the risk (beta)i)) 2) (sigma)ei)) 2) that is independent from the volume of the n (systematic risk, market risk, or non-diversifiable risk) and the risk (sigma)ei)) 2) that approaches to zero as the n becomes greater (non-systematic risk, diversifiable risk, or non-market risk). A sufficiently large portfolio, in which the non-systematic risk may be such small that can be ignored, can use the (beta)i)) as the risk measure for the advertisement product "i".
Thus, the risk index (beta) of the market can provide the important information in comparison between the risk of th

e advertisement market
and the risk of the advertisement portfolio model. Further, the measurement of the correlation (covariance) is significantly important in comparison of risks among an advertisement market model, an advertisement portfolio model and an individual advertisement product.
As for the single index model (S.I.M) described above, a multi-index model (M.I.M) may be established for the case of a plurality of market indexes. Assuming as:
Ik)): the value of the index k;
bik)): the sensitivity index of the advertisement product "i" responsive to the return with respect to a change in the index k;
ai)): the expected value of the individual return for the advertisement product i;
ci)): the random term of the individual return for the advertisement product i;
L: the number of indexes; and
n:the number of advertisement products. Then: where, i = 1,..., n where,i=1,...,n where, i=1, ..., n, and k=1,...,L where,i,j =1, ..., n and i (not equal to) j

Herein, the variance of ci)), Ik)) is defined as follows: where, i = 1, ..., n where, k = 1,..., L
From the above definitional expression ((Yen)) of the multi-index model and the above conditional expression ((Yen)(Yen)), there will be derived such equations as:
The expected value:
The variance:

The covariance:

Herein, it is to be confirmed that if L=1, then the multi-index model may have the same expressions as those of the expected value, variance and covariance in the single index model.

According to the theory of modeling discussed above, when the indexes are specified properly, the return of a certain advertisement product can be described in a simulative manner with individual indexes, and if this method is applied to the risk determination, the risk for a variety kinds of advertisement portfolio models generated by the present system can be measured and determined.

Now, the return in the advertisement product will be described. It will be naturally understood that a buyer in purchasing the advertisement products, as well as in buying the financial products, would make an investment in those advertisement products based on an idea that the product is a kind of means to obtain some return.

For the financial products, for example, the rate of return for the securities "i" in the term "t" may be described as follows: where, respective terms are designated as follows:

: the rate of return for the securities "i" in the period "t" (random variable);

: the price of the securities i in the period t (random variable);

Pi,t))-1)): the price of the securities i in the period t-1 (known);

: the dividend of the securities i in the period t (random variable); and

(tilde): the random variable.

Herein, assuming that a unit of certain securities i would be in conformity with a certain probability distribution and a probability that a certain event "j" may occur is denoted by Pj)), the expected rate of return Ri)) and the variance (sigma)i)) 2) are described as follows: where, the respective terms are designated as follows:

: the probability that the event "j" may occur;

: the rate of return of the asset "i" in the event j;

M: the number of possible events.

For the advertisement product, assuming, for example, that the audience rating of a certain program of the TV advertisement, Ri)), is represented by a random variable associated with a certain probability distribution, an expected value and a variance in the audience rating Ri)) can be expressed by the similar expressions as those written above. Herein, for the case of the advertisement products, the following expression may be established in the relationship between the audience rating and the price; (definitional expression of the CPM)

The CPM is in inverse proportion to the audience rating. Herein, introducing a variable representing a rate of change between the periods t-1 and t in the case of the audience rating increase: and assuming the price of the advertisement product is the same in both periods t-1 and t, then: where,

N: the number of families in a broadcasting area of the program "i" (by a unit of 1000-family);

CPMi,t)): the CPM of the program i in the period "t";

CPMi,t-1)): the CPM of the program i in the period "t-1";

ri,t)): the rate of change in the CPM of the program i in the period t (%);

: the audience rating of the program i in the period "t" (random variable);

Ri,t-1)): the audience rating of the program i in the period "t-1" (known);

Pi,t)): the price of the program i in the period "t"; and

Pi,t-1)): the price of the program i in the period "t-1".

If the described is used to express an expected rate of change and variance for the advertisement product, since the should be a function of the , there will be derived such equations as: where,

: the probability that the event "j" may occur, and

M: the number of possible events.

Taking advantage of the above relationship, the concept of the expected rate of return and variance used in analyzing the financial products can be applied to the analysis of the advertisement products.

The "advertisement portfolio" having been referred to as above will now be explained in supplementary.

In the field of financial business, "a portfolio" generally means " a composition of financial assets owned by a bank, a corporation and so on" and it means particularly in the field of security business "a combination of various securities", but on the purpose of the present invention, "an advertisement portfolio" is defined as "a combination of various kinds of advertisement products owned by a sponsor". That is, in the market where n kinds of advertisement products, Sj)) (j = 1, ..., n) are being dealt with, a total amount of purchasing in the case where the sponsor has bought the advertisement product Sj)) by unit of yj)) may be expressed by (SIGMA)Pj))yj))(j = 1, ..., n), where Pj)) represents an advertising fee of the advertisement product Sj)) per yj)) unit. In this case, a vector y = (y1)), ..., yn))) is referred to as the "advertisement portfolio" owned by the sponsor. Said advertisement portfolio should be specifically referred to as "a program advertisement portfolio" for the advertisement product Sj)) limited to an advertisement on a television program, and similarly it should be referred to as "a newspaper advertisement portfolio" for the Sj)) limited to the newspaper advertisement.

Herein, to calculate the AR index for overall advertisement portfolio y = (y1)),..., Yn))) in the case where the sponsor has bought the advertisement product Sj)) by the yj)) unit, by using the standard deviation of the audience rating for the advertisement product (program) Sj)) denoted as (sigma)j)) and the cumulative distribution function with respect to the random variable x (=audience rating) according to the normal distribution denoted as N(x), the averaged audience rating for the overall advertisement portfolio, Rp)), may be expressed as: and, the variance (sigma) p)) for overall advertisement portfolio may be expressed as: (Where, the (sigma)jk)) is a covariance of the advertisement product j and the advertisement product k.)

Now, the aforementioned "comprehensive advertisement risk management index" will be described.

The comprehensive advertisement risk management index is used to describe, by using an mathematical model, how the statistical data of individual advertisement media obtained from a variety of sample surveys such as an audience rating or a subscription rating of a certain advertisement product varies during period equivalent to the period of the purchasing of the advertisement product, and herein, in specific, the "comprehensive advertisement risk management index" AR (the AR index) is used to refer a maximum loss amount of the CPM under the condition of a certain confidence interval possibly caused by the advertisement product

being exhibited below an expected certain value (an expected audience rating in case of the advertisement on television).

How to calculate the AR index particularly for the television advertisement will now be described in supplementary. Herein, it is assumed that the audience rating R of a program subject to purchase in a certain period is represented by a random variable according to a certain probability distribution. Then, assuming the confidence interval being a%, in the case where a mean value for a population (a population average) is estimated from a sample, if the population is in the normal distribution with a standard deviation (sigma) and a mean value for n of the samples extracted from this population is denoted by X, then generally it is estimated that the mean value "m" of this population may fall;

at the probability (reliability) of 95% in a range (confidence interval) of: and, at the probability (reliability) of 99% in a confidence interval of:

Then, the derivations of (A) and (B) will now be described.

If a probability distribution function of the standard normal distribution is expressed by (PHI)(z) = (1/2(pi))exp(-z2) /2), then from a mathematical table (see, for example, "Black-Scholes differential equation for financial and securities" written jointly by Sadao Ishimura and Sonoko Ishimura, Tokyo Shoseki Co., Ltd, 1999, pp.58-63), there will be derived such equations as: and, similarly,

Further, when the mean value and the standard deviation of the sample in the volume of n extracted from the population in the volume of N (not necessarily be in the normal distribution) are expressed by X and (sigma) respectively, and in addition the N is large enough in comparison with the n wherein the n is large, according to the "central limit theorem",

then the mean value m of the population may be estimated by using above-described (A) and (B).

Herein, aforementioned "central limit theorem" will be described.

The "central limit theorem" expresses the fact that when an arbitrary sample with a volume of n is extracted from a population having the standard deviation of (sigma), a distribution of the sample mean value X approaches to the normal distribution N (m, ((sigma)/n)2)), as the n becomes greater.

As described above, assuming that the audience rating R for the program subject to purchase in a certain period is a random variable and the confidence interval is (alpha)%, then, a minimum audience rating R(alpha) that may possibly occur under that probability may be expressed as follows:

With the expected audience rating specified as R and the advertising cost as W, the comprehensive advertisement risk management index AR under the condition of the confidence interval of (alpha) % can be defined as follows. Wherein, the mean value in the expected audience rating is denoted as R.

Since the CPM calculated with the averaged audience rating can be expressed as W/R, therefore

To calculate the audience rating R (alpha) in the confidence interval (alpha) %, the following three methods are available;

(1) Variance/covariance method

The normal distribution is assumed for the probability distribution, in

which the variance-covariance matrix of the audience rating is calculated first, and then the audience rating R (alpha) in the confidence interval (alpha) % is calculated;

(2) Historical simulation method

This method uses previous audience rating data as an expected future scenario, in which the audience rating R(alpha) is calculated under an assumption that the past audience rating is occurring currently; and

(3) Monte Carlo simulation method

This method does not need any previous audience rating data as an expected future scenario but the future audience rating scenario may be generated by way of the Monte Carlo simulation by using some kind of audience rating estimation model so as to calculate the audience rating R (alpha).

The calculation by using the (1) variance/covariance method, which is the simplest among above three methods, will now be explained.

Herein, it is to be assumed that the standard deviation of the audience rating for a certain program is (sigma) and the cumulative distribution function with respect to a random variable x associated with the normal distribution is N(x).

In this case, the audience rating R (alpha) may be determined as described below:

Accordingly, the comprehensive advertisement risk management index AR may be calculated as follow:

For example, it is to be assumed that theaverage and the standard deviation of the audience rating for the program subject to purchase in a certain period are 20% and 2%, respectively. In this case, if the CPM of the program subject to purchase is assumed to be 1,000yen, then the comprehensive advertisement risk management index AR in the confidence interval (the probability of being not smaller than the value determined by subtracting the doubled standard deviation from the average) of 97.7% may be determined in the following manner.

The standard normal distribution is a normal distribution N (0, 12)) having the mean value of 0 and the standard deviation of 1, according to its definition. It is to be assumed that the variance (sigma)2) of the population in the standard normal distribution ((sigma): standard deviation = -1.00, +1.00) should take a value of 1.00. Then, in order to determine a probability that a certain sample is existing within a range of z = -1.00 (equivalent to) +1.00 around a center equivalent to the average of the population, the standard normal probability distribution function (PHI) (z) is integrated over the range of z = -1.00 (equivalent to) +1.00, and its area (= probability) should be 0.682. That is, if a population is associated with the standard normal distribution, a certain sample extracted from the population is estimated to fall within the range of the (+-) 1 standard deviation at the probability of 0.682.

From the above description, by taking advantage of such a nature pertained to the standard normal distribution that when the standard normal probability distribution function (PHI)(z) is integrated over the range of z = -2.00 (equivalent to) (infinity), the probability is just 0.977, it can be derived that if the audience rating for a certain program is associated with the normal distribution, in order to obtain the program audience rating R(alpha) exceeding the target minimum audience rating RL)) (a value of (PHI)(x) where x = -2 (sigma)) in the confidence interval of 97.7%, a range of the x should be not smaller than the doubled standard deviation (-2 (sigma) (equivalent to) (infinity)).

An important point in this regard is that the probability of the program audience rating R (alpha) falling in a range below the target minimum audience rating RL)) should be used as a reference in the risk evaluation (use of the safety first reference). That is, the probability of the program audience rating R (alpha) falling in the range below the target minimum audience rating RL)) is equal to 1-0.997, wherein the range of x = -(infinity) (equivalent to) -2.00 should be integrated.

If it is desired that the audience rating for a certain program in the normal distribution with the averaged audience rating of 20% and the standard deviation of 2% falls in the range not lower than the target minimum audience rating RL)) at the probability of 97.7% and also takes the program audience rating R (alpha), then the x = R (alpha) should be solved for the case of z = -2.

To convert the normal distribution N(m, (sigma) 2)) into the standard normal distribution N(0, 12)), the equation z = (x-m)/(sigma) may be used. Since in this example z=-2, therefore;

Further, since m = 20 and (sigma) = 2, therefore x = R (alpha) = 16%, and according to the definition of the AR index: the loss amount in the case of the audience rating reaching to 16% is calculated as follows:

Accordingly, it may be said that the maximum unexpected loss amount in the CPM, which may possibly be incurred by this advertisement product having the rate of return below the expected value under the condition of the probability of 97.7%, should be 250yen. (Under the condition of the confidence interval of 97.7%, there is a possibility that the audience rating is 16%, and in that case, the CPM should be calculated to 1,250yen.

In the actual trading, since the prediction of the future audience rating is impossible, therefore an averaged audience rating over a certain period is assumed as an actual audience rating to be used as trading data, but if there is any method that can calculate virtually a risk occurring from the variation in the previous audience rating and can generate such a selection pattern of the advertisement product that can minimize said risk, the method may help reduce the risk of the sponsor with respect to the audience rating variation.

Now, the relationship between said "advertisement portfolio" and said "comprehensive advertisement risk management index" will be described.

The relationship between the advertisement portfolio and the comprehensive advertisement risk management index will be explained by way of a specified example where a sponsor is going to offer an advertisement in a program on television.

The probability in the daily weather is 1/3 for sunny, cloudy and rainy, respectively. From the statistical data for the past, it is observed that the audience rating of the program A may be 6% for sunny, 10% for cloudy and 20% for rainy weather. The program B is a live broadcast of a night game, in which it has been found from the similar statistical data for the past that the program B may achieve the audience rating of 9% for sunny weather, and the night game live broadcasting should be cancelled in case of rain and substituted with a rerun program, which may achieve the audience rating of 5%.

Then, consider that under the condition described above, which program the sponsor should buy in what manner. It is to be appreciated that the CPM calculated from the offer price of the program should have been determined for each of the programs.

In the case represented in Table 1, based on the comparison between the

program A and the program B, it can be said that the program A is more favorable from the viewpoint of the averaged audience rating but the program B is more favorable from the viewpoint of the standard deviation, which means it is difficult to determine which program should be preferable.

On the other hand, based on the comparison between the program B and the program C, it may be said that the program C having the same in the averaged audience rating but the half in the standard deviation is more preferable.

However, when the program portfolios of the advertisement products are generated as such represented in Table 2, the program portfolio D having the combination of the offers by 20% for the program A and 80% for the program B may achieve the higher averaged audience rating and smaller standard deviation as compared with the program portfolio C having the offer totally directed to the single program C. Further, the CPM of the program portfolio D may be cheaper than that of the program portfolio C. In this regard, it should be noted that the calculation of the CPM of the program portfolio is not simply a weighed averaging of each program. For example, the CPM of the program portfoli

o D may be calculated in the following manner.

At first, it is assumed that the advertising fee for the program "i" (per 1000 people) is denoted as Wi)) and the averaged audience rating as Ri)). Secondarily, assuming that the CPMs of the program A and the program B are denoted by CPMA)) and CPMB)), respectively, then;

Herein, assuming that the ratios of offer to the program A and the program B are denoted by XA)) and XB)), respectively, the advertising fee WD)) of the program portfolio D is written as: and, accordingly the CPM of the program portfolio D may be calculated as:

If this calculation is applied to the sample of Table 2, then

Generally, if the number of programs constituting the program portfolio is N, the CPM of the program portfolio P may be calculated in the following manner. where, Rp))= (SIGMA)Xi))Ri)).

Although the above example has described illustratively a study in which only the relationship between the audience rating and the cost has been taken as the criterion, upon buying a program in practice, there must be such a case where the condition for selecting the adverting media is taken into account to make a decision on the purchase so that those factors including whether or not the contents of the program match with the enterprise activity or image can be reflected on the condition for the selection.

In that case, since there must be a need for a mechanism in which, in addition to the above-described relation between the audience rating and the cost, a factor relating to a qualitative effect of the advertising media should be taken into account on the system, the program evaluation data must be inputted as an essential factor, which will be described later.

Now, the subject that in the case where 3 units of regular programs are going to be provided for half a year, which kind of advertisement portfolio or which kind of combination of the programs is desirable will be examined by using the comprehensive advertisement risk management index AR (hereafter, referred to as the AR index, if appropriate).

Herein, it is to be assumed that there are 3 units of regular programs

A, B and C, and the audience rating for each of them is in the normal distribution. When the averaged audience rating, the standard deviation of the audience rating and the CPM for recent 6 months are specified as shown in Table 3, then it will be examined that which program the sponsor should buy in order to minimize the risk.

In this case, according to the AR index, preferably the program C should be offered. However, if the advertising budget is abundant to buy a plurality of programs in combination, then with reference to the preceding study, there may be made a comparison between the AR index for the program portfolio C in which the single program C is offered for 2 minutes and 30 seconds (even a case of single program can be considered as a program portfolio), and the AR index for the program portfolio D including the combination of the programs A and B (the portfolio in which the program A is offered for 30 seconds and the program B for 2 minutes), as shown in Table 4.

As is obvious from Table 4, the purchase of the portfolio D including the combination of the programs can decrease the AR index rather than offering the programs A, B and C respectively as a single unit.

From the above study, it has been found that if by way of forming a program portfolio (the advertisement portfolio) consisting of a combination of some programs, a risk amount for the entire program portfolio occurring from a variation in the averaged audience rating could be calculated based on the indexes including the averaged audience rating, the standard deviation and the CPM of said program portfolio, and thereby a selection pattern of the advertisement product that can minimize said risk amount could be generated, then the risk of the sponsor in association with the audience rating variation could be further reduced rather than the case where a decision on the purchase of the individual program is made based on the indexes such as the averaged audience rating, the standard deviation and the CPM for each individual program. Further, the introduction of the AR index as described above makes it possible that the absolute risk amount in the purchase unit of the advertisement product and the advertising fee that may occur upon buying a combination of the advertisement products both on television and newspaper can be converted to the relative risk amount, and thereby all of the generated advertisement portfolios can be comparatively evaluated according to the integrated index, the AR index.

To generate an optimal operational plan of the advertisement cost in a comprehensive and reasonable manner by using the studies as explained above, it is required to establish a theory, as will be described below.

Then, "the comprehensive advertisement risk management index and the program portfolio model theory" according to the present invention will be described.

It is to be assumed that in the market trading n kinds of programs, Sj)) (j=1, ..., n), the averaged audience rating in a certain audience attribute over a certain period is denoted by Rj)) and the standard deviation therein is denoted by (sigma)j)). The total amount for the case where the sponsor has bought the program Sj)) by unit of yj)) is expressed by (SIGMA) Pj))yj)) (where, the Pj)) represents the advertising fee of the advertisement product Sj)) per yj)) unit).

In this expression, the vector: is referred to as "the program portfolio" owned by the sponsor.

Herein, the covariance of the audience rating of the program Sj)) and

the audience rating of the program Sk))' is denoted by (sigma)jk)), and the total budget amount spent by the sponsor is denoted by WL)) for the upper limit and WU)) for the lower limit.

Since the purchase of the program has to be handled by a certain integer unit, it is not always possible to buy the programs so as for the budget amount predetermined by the sponsor to coincide with the actual total amount spent for purchasing the programs, but the upper and lower limits of the total budget amount to be spent by the sponsor should be set such that some share in the budget predetermined by the sponsor can be allocated to the actual purchase of the programs. At that time, if the averaged audience rating RP)) of the program portfolio is not less than a specified value, the issue in minimizing the variance of the averaged audience rating can be formulated as follows:

The formula (2) can be rewritten to a linear constraint formula such as: (SIGMA)(Rj))- RE)yj))>=0. Further, since it is possible to describe as: therefore it is to be understood that reducing the standard deviation (sigma)p)) of the program portfolio is equivalent to reducing the AR index of the portfolio, ARp)).

The present invention has been described in detail, and as noted in the description, according to the present invention, by simply setting those parameters to be considered as an input condition, the portfolio models of the advertisement products can be automatically generated, and by processing the product data for those advertisement products in a statistical manner, the AR index can be calculated for each of those portfolio models so as to provide the sponsor with the optimal selection of the portfolio model of the advertisement product. Further, applying those comprehensive advertisement risk management systems make it possible to quantify the advertisement trading risk not only for the advertisement portfolios but also for the individual advertisement product and thus to provide such an advertisement derivative product model that can reduce the quantified risk.

Further, the present invention allows the user to make a simulative calculation on a large variety of methods so as to grasp the feature or the trend in each of the methods, so that the present invention can provide a flexible response to a change in the models associated with the environmental change in the market after the system for calculating the AR index having started its operation.

POSSIBILITY OF THE INDUSTRIAL APPLICATION

Since in an advertisement portfolio model according to the present invention, firstly a relational expression to determine a comprehensive advertisement risk management index is derived, which is an index for statistically representing a maximum unexpected loss amount which the advertisement product may be subject to at a certain probability during the advertising campaign period, secondarily a plurality of correlation coefficient data of the advertisement product is calculated from observational data of the advertisement product, and thirdly an optimal combination of the advertisement products is figured out in order to analyzeat least either one of an effect, an efficiency or a risk of the advertisement product based on the relational expression for determining the comprehensive advertisement risk management index and the plurality of correlation coefficient data or the observational data which has taken the correlation into account indirectly, therefore the optimal combination of the advertisement products can be provided for the

sponsor.

Since a comprehensive advertisement risk management system taking advantage of the advertisement portfolio model according to the present invention is the comprehensive advertisement risk management system using the optimal advertisement portfolio model to analyze at least either one of the effect, the efficiency or the risk of the advertisement product, and said system comprises: an input means for entering a setting condition required to calculate the comprehensive advertisement risk management index; a model generation means for generating a plurality of advertisement portfolio models by firstly calculating a plurality of numeric values relating to the advertising effect and the advertising efficiency from the observational data in the past according to the setting condition entered by the input means, and by secondarily calculating a plurality of correlation coefficient data for the advertisement product from the purchased advertisement product data; a verification means for comparing the plurality of those generated advertisement portfolio models to actual data during a period of said advertisement product being offered and for verifying that said plurality of advertisement portfolio models is adaptable to the real condition; and a selection means for selecting a most suitable advertisement portfolio model with respect to the risk analysis and the effect analysis of the advertisement product from said plurality of advertisement portfolio models based on the verification result by said verification means, therefore the present invention can provide such a system that allows the user to make a comprehensive decision on the investment to the combination of the advertisement products.

Since an investment decision method using the advertisement portfolio model according to the present invention comprises the steps of: entering a setting condition required to calculate the comprehensive advertisement risk management index; calculating a plurality of numeric values relating to the advertising effect and the advertising efficiency from the observational data in the past according to the setting condition entered by the input means; calculating a plurality of correlation coefficient data for the advertisement product from the advertisement product data for the purchased advertisement product; generating a plurality of advertisement portfolio models based on the calculation results; comparing a plurality of those generated advertisement portfolio models to actual data during a period of the purchased advertisement product being offered; verifying that said plurality of advertisement portfolio models is adaptable to the real condition based on the comparison result; and selecting a most suitable advertisement portfolio model with respect to the risk analysis and the effect analysis of the purchased advertisement product from the plurality of advertisement portfolio models based on said verification result, therefore the present invention allows the sponsor to make a comprehensive decision on the investment to the combination of the advertisement products.

CLAIMS EP 1244036 A1

1. An advertisement portfolio model, in which firstly a relational expression to determine a comprehensive advertisement risk management index is derived, which is an index for statistically representing a maximum unexpected loss amount which an advertisement product is subject to at a certain probability during an advertising campaign period, secondarily a plurality of correlation coefficient data of

said advertisement product are calculated from an observational data of said advertisement product, and thirdly an optimal combination of said advertisement products is figured out in order to analyze at least either one of an effect, an efficiency or a risk of said advertisement product based on said relational expression for determining said comprehensive advertisement risk management index and said plurality of correlation coefficient data or the observational data which has taken the correlation into account indirectly.

2. An advertisement portfolio model in accordance with claim 1, in which said advertisement product comprises at least two or more different advertisement products.
3. An advertisement portfolio model in accordance with claim 1 or 2, in which said advertisement product includes at least one advertisement derivative product.
4. An advertisement portfolio model in accordance with claim 3, in which said advertisement derivative product is constructed so as to measure a risk in an individual advertisement transaction and at the same time, to reduce the risk in the individual advertisement transaction.

5. A comprehensive advertisement risk management system using an optimal advertisement portfolio model to analyze at least either one of an effect, an efficiency or a risk of an advertisement product, said system comprising:
 an input means for entering a setting condition required to calculate a comprehensive advertisement risk management index;
 a model generation means for generating a plurality of advertisement portfolio models by firstly calculating a plurality of numeric values relating to an advertising effect and an advertising efficiency from an observational data in the past according to said setting condition entered by said input means, and by secondarily calculating a plurality of correlation coefficient data for a purchased advertisement product from an advertisement product data of said purchased advertisement product;
 a verification means for comparing said plurality of those generated advertisement portfolio models to actual data during a period of said advertisement product being offered and for verifying that said plurality of advertisement portfolio models is adaptable to the real condition; and
 a selection means for selecting a most suitable advertisement portfolio model with respect to a risk analysis and an effect analysis of said purchased advertisement product from said plurality of advertisement portfolio models based on a verification result by said verification means.
6. A comprehensive advertisement risk management system using an advertisement portfolio model in accordance with claim 5, in which said advertisement product comprises at least two or more different advertisement products.
7. A comprehensive advertisement risk management system using an advertisement portfolio model in accordance with claim 5 or 6, in which said advertisement product includes at least one advertisement derivative product.
8. A comprehensive advertisement risk management system using an advertisement portfolio model in accordance with claim 7, in which

said advertisement derivative product is constructed so as to measure a risk in an individual advertisement transaction and at the same time, to reduce the risk in said individual advertisement transaction.

9. A comprehensive advertisement risk management system using an advertisement portfolio model in accordance with either of claim 5 to 8, in which a plurality of numeric values relating to said advertising effect and said advertising efficiency is represented by two or more values selected from a group consisting of values relating to an audience rating, a cost per mil (CPM), a reach, a frequency and a recognition.

10. An investment decision making method using an advertisement portfolio model, comprising the steps of:

entering a setting condition required to calculate a comprehensive advertisement risk management index;

calculating a plurality of numeric values relating to an advertising effect and an advertising efficiency from an observational data in the past according to said setting condition entered by said input means;

calculating a plurality of correlation coefficient data for a purchased advertisement product from an advertisement product data of said purchased advertisement product;

generating a plurality of advertisement portfolio models based on the calculation results;

comparing a plurality of those generated advertisement portfolio models to actual data during a period of said purchased advertisement product being offered;

verifying that said plurality of advertisement portfolio models is adaptable to a real condition based on the comparison result; and

selecting a most suitable advertisement portfolio model with respect to a risk analysis and an effect analysis of said purchased advertisement product from said plurality of advertisement portfolio models based on said verification result.

11. An investment decision making method using an advertisement portfolio model in accordance with claim 10, in which said advertisement product comprises at least two or more different advertisement products.

12. An investment decision making method using an advertisement portfolio model in accordance with claim 10 or 11, in which said advertisement product includes at least one advertisement derivative product.

13. An investment decision making method using an advertisement portfolio model in accordance with claim 12, in which said advertisement derivative product is constructed so as to measure a risk in an individual advertisement transaction and at the same time, to reduce the risk in said individual advertisement transaction.

14. An investment decision making method using an advertisement portfolio model in accordance with either of claim 10 to 13, in which a plurality of numeric values relating to said advertising effect and said advertising efficiency is represented by two or more values selected from a group consisting of values relating to an audience rating, a cost per mil (CPM), a reach, a frequency and a recognition.

[File 20] **Dialog Global Reporter** 1997-2006/Jul 22

[File 476] **Financial Times Fulltext** 1982-2006/Jul 23

[File 610] **Business Wire** 1999-2006/Jul 22

**File 610: File 610 now contains data from 3/99 forward. Archive data (1986-2/99) is available in File 810.*

[File 613] **PR Newswire** 1999-2006/Jul 22

**File 613: File 613 now contains data from 5/99 forward. Archive data (1987-4/99) is available in File 813.*

[File 624] **McGraw-Hill Publications** 1985-2006/Jul 21

**File 624: Homeland Security & Defense and 9 Platt energy journals added Please see HELP NEWS624 for more*

[File 634] **San Jose Mercury** Jun 1985-2006/Jul 21

[File 810] **Business Wire** 1986-1999/Feb 28

[File 813] **PR Newswire** 1987-1999/Apr 30


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?  s optimal? (w) portfolio?
        425029   OPTIMAL?
       3326314   PORTFOLIO?
S1        2048   S OPTIMAL? (W) PORTFOLIO?

?  s s1 not py>1999
Processing
Processing
Processing
          2048   S1
      58392092   PY>1999
S2         926   S S1 NOT PY>1999

?  s s1 and s2 and aggregat?
          2048   S1
           926   S2
       1064677   AGGREGAT?
S3         213   S S1 AND S2 AND AGGREGAT?

?  s s1 and s2 and disaggregat$
          2048   S1
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         926   S2
           0   DISAGGREGAT$
S4         0   S S1 AND S2 AND DISAGGREGAT$

?  s future? (n2) value?
Processing
Processing
    11877041   FUTURE?
    10676212   VALUE?
S5     61410   S FUTURE? (N2) VALUE?

?  s s1 and s2 and s5
        2048   S1
         926   S2
       61410   S5
S6        43   S S1 AND S2 AND S5

?  s (portfolio? (n2) scenarios? or portfolio? (w2) scenarios?)
     3326314   PORTFOLIO?
      265513   SCENARIOS?
         680   PORTFOLIO?(2N)SCENARIOS?
     3326314   PORTFOLIO?
      265513   SCENARIOS?
         212   PORTFOLIO?(2W)SCENARIOS?
S7       680   S (PORTFOLIO? (N2) SCENARIOS? OR PORTFOLIO? (W2) SCENARIOS?)

?  s disaggregat$
S8         0   S DISAGGREGAT$

?  s disaggrat?
S9         1   S DISAGGRAT?

?  s disaggregat?
S10    18318   S DISAGGREGAT?

?  s s7 and s10
         680   S7
       18318   S10
S11        2   S S7 AND S10

?  rd
S12        2   RD  (UNIQUE ITEMS)

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11/9/1 (Item 1 from file: 15) **Links**

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Stress testing a commercial loan portfolio

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Abstract:

What are exceptional issues in market-risk modeling are everyday challenges on the credit side. This makes stress testing, where data shortfalls are obviated by management judgment and experience, all the more valuable as a check on the output of a credit portfolio model. Even if the historical data feeding such a model takes in a recent past recession, the model can say nothing about the likelihood, timing, or severity of the next recession or its particular impact on the portfolio. Stress testing needs to identify the range of downside events like that and to assess the institution's vulnerability, by major segment and for the balance sheet as a whole. Fundamentally, then, it is a tool for enhancing understanding of the risk profile and for meaningfully communicating that to senior management.

Text:

As the tools and practices of creditrisk management have grown in sophistication in recent years, new demands are being placed on the industry. Regulators, analysts, shareholders, directors: All are expecting to see progress in applying the techniques of portfolio theory to measuring and managing loan portfolio risk, at least at the larger and publicly traded institutions.

Stress testing is one such exercise, albeit one that has been around for a while in other guises. Credit analysis on larger loans, for instance, has long included an assessment of how well an individual borrower's debt-servicing capacity can withstand predefined stresses. As another example, the richness of the historical data available on traded instruments and the processing power of the VAR (value at risk) models being fed that data means that stress testing on market risk has been well established for years.

In comparison, credit stress testing at the portfolio level is an ill-defined exercise, even as regulators start to give it more attention. A literature review won't pull up much beyond the data-intensive marketrisk modeling that has only limited applicability to credit stress testing. Yet the underlying rationale for stress testing market risk offers some useful insight for the credit-risk side. A Bank for International Settlements (BIS) report from earlier last year' emphasized the importance of stress testing in contexts (such as emerging markets) where risks may not be well captured by statistical measures like VAR. The BIS had in mind such problems as inadequate historical data and model rigidities like fixed correlations.

By definition, exceptional circumstances occur rarely, and statistical inference is imprecise without a sufficient number of observations. . . . In the absence of a reliable statistical measure of the probability of such an event, stress-testing calls on the informed judgment of risk managers

and senior executives to assess whether, and to what degree, the firm should move to limit or modify such an exposure. [page 13]

What are exceptional issues in marketrisk modeling are everyday challenges on the credit side. This makes stress testing, where data shortfalls are obviated by management judgment and experience, all the more valuable as a check on the output of a credit portfolio model. Even if the historical data feeding such a model takes in a recent past recession, the model can say nothing about the likelihood, timing, or severity of the next recession or its particular impact on the portfolio. Stress testing needs to identify the range of downside events like that and to assess the institution's vulnerability, by major segment and for the balance sheet as a whole. Fundamentally, then, it is a tool for enhancing understanding of the risk profile and for meaningfully communicating that to senior management.

THE SCOPE OF THE EXERCISE
Credit Risk Only

Our analysis will be restricted to stress testing on credit events, but the delineation is not always clearcut. In some cases, the effects of an event can be construed as more than one type of risk. For example, Basel II debates whether the treatment of documentation and other legal risks associated with credit derivatives should be treated as operating or credit risk.

Of potentially greater significance, a given event may have implications, through different channels, for more than one type of risk, which raises questions of diversification effects across risk type. Interest rates provide a classic example of this. Higher rates tend to slow demand and revenue growth and to raise interest expense, thereby pushing up default and loss probabilities. This will be either offset or exaggerated by the institution's asset versus liability sensitivity on its overall book. An asset-sensitive institution will experience faster repricing on its assets than its liabilities, meaning that net-interest margins will rise in a higher-rate environment and provide some natural hedge against credit risk and vice versa.

Commercial Loan Perspective

The approaches outlined in this article focus on issues raised in stressing a commercial loan portfolio. The challenges are greater there, as are the consequences of getting it wrong. The homogeneity of loss patterns in consumer portfolios considerably simplifies the analysis there; stress factors can be set and applied across much broader portions of the portfolio than is the case for commercial exposures. The underlying structure of the exercise, however, is not substantively different.

A Focus on Expected Losses

The target variable for most of our analysis is the change in expected losses (EL), that is, how the mean level of loan losses will climb under a stress scenario. The key driver of that typically will be changes in the probability of default (PD), although we will also bring into the analysis changes in the other two determinants of EL: loss given default (LGD) and

exposure at default (EAD).

We will also recognize that in a downside scenario, an institution will require increased capital to cushion not just the higher estimated losses but also the wider band of uncertainty surrounding that higher estimate. This will be discussed below. So will opportunities to bring in other, less direct indicators of risk beyond loan losses.

Reasonably Possible Downside Scenario

The intent of this exercise is to assess an institution's ability to withstand downward pressure on credit quality arising from a credit event of reasonable possibility. It's not a forecast. Nor is it the x-in-10,000, solvency-threatening turn of events that VAR analysis dwells on. Rather, it's a scenario constructed from past experience and current circumstances: the worst we expect might befall us. Implicit, if not explicit, in this is a percentage likelihood of this scenario coming to pass. This becomes important to keep in mind when we look at segment-level stress testing; stress factors can be customized to each segment, but the amount of stress should be set such that it represents roughly the same probability of occurrence for each factor and each segment.

THREE LEVELS OF STRESS TESTING

Stress testing can be conducted at three levels, the first, already familiar to most lenders (and not a focus of this article), the second and third related but with differing goals and approaches: borrower-level stress testing, macrolevel stress testing, and segment-level stress testing.

BORROWER-LEVEL STRESS TESTING

For commercial loans above some dollar threshold, most lending institutions will require their lenders to look at a borrower's ability to withstand stress, in particular, a customer's ability to continue to service debt as agreed. "Stress" likely will include an interest-rate shock but also other events specific to the borrower's industry and operating environment. Impact is assessed based on financial statement analysis: how key financial variables, like debt-service coverage, are affected by resulting changes in revenue and/or expense items. Borrower-level effects certainly will come into this article along the way, but our analysis is at a more aggregated (portfolio or segment) level.

MACROLEVEL STRESS TESTING

Jumping now from the individual obligor to the total portfolio, well start with the tie-in between this exercise and a bank's concentration management. The latter should start with segments defined as having (1) high correlation in potential losses between borrowers within a segment and (2) relatively low correlation between segments (that is, between pairs of borrowers in different segments). While the intersegment correlations may be low, they will certainly not be zero, due to macrolevel, cross-sector effects, the systematic risk factors of portfolio theory. These include interest- and exchange-rate changes, cyclical fluctuations in employment and income, and equity market movements. Whereas concentration management

focuses on limiting a banks exposure to risks emanating from and largely confined to a given segment, macrolevel stress testing will pick up the risks that cut across segments-big events like recessions. Rather than setting overall exposure limits to guard against such risks, banks hold reserves and capital; this becomes, then, an exercise in assessing the overall adequacy of reserves and capital to absorb the loan losses and the erosion of capital associated with reasonably possible downside stress.

Capital Adequacy

Economic capital models provide a means for making such an assessment. This is a somewhat crude tool, in part because expected losses don't match up exactly with reserves or unexpected losses with capital. This is thanks to the narrower regulatory interpretation, driven by the Securities and Exchange Commission (SEC), of loss reserves as being intended to cover probable and estimable losses associated with what's already transpired, rather than from what might happen in the future. If we recognize reserves and capital as together representing an institution's cushion against losses, then we can compare their sum with the combined total of expected and unexpected losses. In a stress scenario, both expected and unexpected losses will rise. By how much will that combined increase eat into the bank's available capital (broadly defined to include the full amount of loss reserves)?

Standard and Poor's (S&P) provides some further guidance on assessing capital adequacy as part of credit stress testing. Its analysts suggest[2] that an institution allow for up to three years without capital market access and still have enough capital through that period to stay in the business of making new loans. They also advise taking account, in a downside scenario, of the impact of forced rollover of maturing loans and of a drying up of liquidity for loan sales. Both have implications not only for liquidity management but also for capital management. The thrust of S&P's suggestions is, importantly, to broaden the scope of credit stress testing: While increased loan losses may be our central focus, we should also recognize other, related demands on available capital and contemporaneous constraints on external sources of new capital.

A Couple of Issues

First, an elaboration on the words "reasonably possible." This is quite distinct from the 10-in-10,000 (give or take) occurrence that might render a bank insolvent and that drives an economic capital calculation.[3] In stress testing, we're concerned with downside outcomes that historical experience suggest might befall us, the 300-basis-point short-term rate increase that we saw in 1988 and 1989 and again in 1994, for instance, or equity market corrections of varying severity, depending on how long a time frame one allows. Implicitly, at least, a probability is being assigned to the stress scenario, one that reflects not only its historical frequency but also the current situation; "downside" means something different at a cyclical peak than it does elsewhere in the cycle.

The second, and related, issue concerns the interpretation of the economic capital cushion. Should the stress event be viewed as an x standard deviation movement within the existing loss distribution, eating up some of

the capital we hold to protect against this sort of thing but leaving the distribution's mean/variance parameters unchanged? Or should this instead be viewed as a shift of the whole distribution, giving it a higher mean (expected loss) and higher dispersion (unexpected loss, UL) around that mean? While the former has some logic to it, it is the latter that is the more conservative interpretation, closer to a regulatory perspective. In a period of higher credit losses, an institution will be expected not just to replace but also to augment its capital. Our analysis here, therefore, is premised on a stress-induced increase in both expected and unexpected losses.

Macrolevel Stress Testing: Tools and Approaches

While the computation of EL is straightforward,4 a risk-adjusted return on capital (RAROC) or credit portfolio model is required in order to determine UL, reflecting correlation effects as well as stand-alone variability. UL, equivalent to one standard deviation of the loss distribution, times the appropriate capital multiplier (to shrink the right-hand tail of the loss distribution and, therefore, the probability of the institution itself becoming insolvent, in accordance with the desired agency rating), provides a measure of the amount of capital that an institution needs to hold to protect itself against credit risk.

We need to recognize that in periods of credit stress, all of the determinants of UL-the variability of PD, LGD, and EAD, as well as the covariability of loss experience-tend to increase, implying greater uncertainty of losses and a correspondingly greater need for capital. This concurrent spiking of all these variables is a dangerous channel of transmission of shocks that credit portfolio models typically assume away. While correlation effects are the major driver of UL and capital allocations in a large portfolio, they're also very difficult to estimate from historical data and even harder to forecast, especially under stress. So they're held constant. From correlations come the concentrations that can, literally, bring down the bank. Informed judgment can improve on what the data can't tell us, but we need to keep in mind that "[e]ach market crisis or major loss reveals surprising new sources of concentration."5 The art is in the anticipation.

Moving onto the mechanics, how might we translate a hypothesized macrostress into changes in the variables that drive EL and UL? There are three possible approaches:

* Historical experience
* Current and projected conditions
* Modeling

With sufficient time, resources, and data, one might use all three approaches for all the variables in question. In practice, that may be necessary only for default rates, which typically exhibit both the greatest variability and the greatest impact on loss experience.

Modeling Default Rates

Modeling default rates can be done in several ways. There are bottom-up approaches that consider the company-level sensitivity of borrowers to a prespecified shock and then aggregate across borrowers. There are also top-down approaches that are based on average sensitivities across a portfolio. A couple of bottomup approaches are described below:

Financial statement driven. Using financial spreads on individual customers, or perhaps a representative sample of them, offers the flexibility of hitting specific financial statement items, depending on the source of the stress, interest expense, for example, or revenue growth and gross margin in the case of a recession scenario. When each company's financials have been reconfigured, a tool for recomputing PD is the most straightforward way to proceed. This would be a private-firm model, such as offered by KMV, Moody's, and LPC, which use key financial ratios or growth rates (in some cases together with industryspecific calibrations) to make that calculation. Without such a default tool, however, it becomes a much messier exercise.7 All of this underlines an important issue. Using financial statement information is an attractive way to proceed (especially when a portfolio is dominated by private companies). Nonetheless, without the right management information system (MIS) tools, it won't get you far.

Equity-value driven. An alternative (or perhaps additional) approach brings in those default tools (for example, from KMV, Moody's) that draw on changes in equity valuations as a proxy for any of a number of macrolevel shocks. This tends to be a less satisfying approach, partly because most institutions' customer base will be disproportionately represented (by number, if not by dollar value) by privately held companies and also because sharp, short-term shifts in equity prices do not typically correspond to such pronounced shifts in underlying creditworthiness. (These models tend to be more useful for highlighting PD trends and peer comparisons.) This can be a useful check on the reasonableness of what comes out of a financial statement approach.8

Top-down approaches should be more straightforward but in practice tend to be difficult to implement with any reliability across a portfolio. Regression analysis can be conducted on portfolio data (if enough of a time series can be assembled) and on banking system data (such as the FDIC's), using default or chargeoff rates as the dependent variable. As explanatory variables, one could try interest rates, gross domestic product (GDP), employment, or perhaps more stateor region-specific indicators in the case of a less dispersed institution. As an alternative method, CreditMetrics offers a simulation capability with these macroeconomic influences already embedded.

Among the problems that can dilute or distort the results from these top-down default prediction approaches is the muddied interrelationship between changes in interest rates and changes in GDP The fact that rate increases (such as the Fed would engineer late in a business cycle) tend to restrain demand growth and economic activity, as well as to increase debt-servicing costs, suggests a positive relationship between interest rates and defaults. However, the causation can run the other way too, a strong economy pushing defaults down but at the same time, via increased demand for credit, pushing rates up and implying a negative

interestrate/default relationship? Working with macroeconomic data, the upshot is a diluted relationship, probably still positive but not necessarily. We know that rates are important, but the influence is difficult to isolate. Exchange rates, another macrovariable with pervasive influence, offers similar complexities vis-a-vis changes in interest rates (and, again, GDP).

Stressing the Remaining Variables

From these various approaches, a hypothesized weighted-average increase for the default rate across the whole portfolio under a stress scenario can be compared, for reasonableness, with internal and external benchmarks available: internally, drawing on the institution's own historical data to see how default patterns behaved in previous periods of credit stress; externally, using default or bankruptcy data from sources such as the rating agencies, Dun & Bradstreet, and the American Bankruptcy Institute.

As for the remaining variables-loss given default, loan equivalent factor (LEO) (that is, a portion of any undrawn credit), their variances, cross-borrower default correlations-historical experience (that is, how they've behaved under past stress conditions) provides the most useful guidepost. The credit loss databases available from LPC and Moody's are an obvious starting point for this. History can be tempered by bringing in current and expected conditions, for example, recognizing different sensitivities at different points in the credit cycle. While projecting trends is easy enough, picking the turning point in a cycle isn't. Forecasting sources like DRI/WEFA and Economy.com can be useful input here, as can the publishers of consensus forecasts, like Blue Chip and Consensus Economics.

The final stage is to generate the EL and economic capital impact of those combined changes, to be compared with the institution's total available capital. Again, the EL calculation is an easy spreadsheet exercise, while economic capital requires access to a credit portfolio model. Before closing, it needs to be recognized that, in order to come up with a broad assessment of overall capital adequacy, we need to take account of missing pieces. First, the noncommercial portfolio, where the ability to treat homogeneous exposures in buckets rather than individually simplifies the analysis, with the basic methodology remaining the same. Second, noncredit risk, Stress testing on market and operating risk raises issues well beyond the scope of this article. Neverthe

less, the final stage here of comparing available with required capital does mean that they should be accounted for. In the case of market risk, that should already be going on elsewhere in the organization. Stress testing operating risk is much trickier. As a crude alternative, one might argue that the effect of ignoring the stress-scenario behavior of noncredit risk may be very roughly counterbalanced by ignoring the diversification benefits that will come from less than perfect correlation between the three sources of risk.10

SEGMENT-LEVEL STRESS TESTING

Analysis at the portfolio (bankwide) level is too blunt an exercise to shed light on vulnerabilities within the portfolio. It also effectively restricts the stress scenarios to those defined by broad macroeconomic phenomenon like interest rate or other business cycle changes. Moving down to the segment level offers the flexibility to isolate segment-specific influences and to anticipate their loss effects. This can provide a check on the setting of concentration limits. Should a stress event of some reasonable possibility show a significant impact on a segment, that vulnerability should be taken into account in the process of determining that segment's limit. Likewise, the information can feed into the determination of the unallocated portion of a bank's loan-loss reserves.

This exercise should provide some measure of the sensitivity of a segment's losses to anticipated changes in key revenue and/or cost drivers: retail sales for the retail industry, advertising spending for the media industry, oil prices for the energy industry. This is what the Office of the Comptroller of the Currency (OCC) drives at in its Advisory Letter 97-3 when it talks about developing what-if **scenarios** for key **portfolio** segments, assigning probabilities to "trigger events," and then projecting outcomes.

These applications of stress-test results focus on the EL impact: By how much are losses expected to increase within a segment? For this purpose, collecting the additional data required to go through the economic capital calculations is not essential, given how the results are to be used. Besides simplicity, this has the advantage of transparency; interpreting and explaining segment-specific results to the relevant business and credit units is far more straightforward when it stops at EL. This has added importance here because it should be information assembled with the assistance of (as well as for usage by) those senior line and credit managers. Their insights should guide the choice of target variables) and the amount by which they should be stressed. It should certainly match up with any stress testing (whether at the borrower or the segment level) a line unit is already doing. Besides bringing in a loss perspective for the segment that may not otherwise be there, the involvement of a central portfolio management unit can introduce some correspondence across segments in the severity of the credit events to be applied-having them be of roughly the same likelihood for each segment, so that there is comparability for assessing relative vulnerabilities.

Then all this needs to be applied, that is, managing the level and composition of loan exposure to protect against what a stress event will bring. "Bank management should consider developing contingency plans for scenarios and outcomes that involve credit risk in excess of the bank's established tolerances."tI Those tolerances relate to the issue of overall capital adequacy and access. Where a stress scenario may exert undue pressure on capitalization, segment-level stress testing sheds light on the segments requiring closer monitoring and control. Cyclical industries are a case in point. Their vulnerability suggests attention to new loan growth as a cyclical expansion matures. If this is accomplished by tighter underwriting criteria, leverage may be a good place to start, given the way that swings in revenues through the cycle have a magnified effect the farther down the income statement one goes.

Segment-Level Stress Testing: Tools and Approaches

The tools and approaches for segment-level stress testing are the same as those for portfolio-level analytics but adapted to the different data specifications. Again, the most important tool is going to be financial spreads, assuming an MIS capability to impose on each individual borrower the desired stress effects and then to roll borrowers up to a segment composite. The methodology would be as described previously: changing a given financial statement variable by the same percentage amount across all borrowers in a given segment, then using one of the several available software tools to recompute the default probabilities.

This financial statement approach has the added advantage of offering other yardsticks for assessing segment vulnerability to supplement our focus here on loan-loss effects. With borrower financial information captured in a standard spreadsheet format, key financial ratios can be analyzed: how the average or median ratio within the segment changes poststress; how many customers are pushed above or below some threshold level of a ratio; and even (in the event that the required data can be manageably captured) how many customers would be out of compliance with financial covenants.

A second approach, mirroring our earlier discussion, would be equity-value driven, making use of a Merton-type default prediction model.12 The only substantive difference, moving to the segment level, is the use of industry share price indices, such as offered by S&P. Those can be analyzed historically in order to come up with a reasonable estimate of price changes in a given segment in a situation of credit stress. There may be opportunity to factor in analysts' estimates (for example, their worst-case outlook for a segment or for a grouping of key players within it), in order to provide a more forward-looking perspective that reflects current circumstances and recent trends. The percentage reduction in share price that comes out of this analysis then gets applied to all companies in the segment, to be run through whatever public-firm default prediction model is used to generate the new, higher PDs across the segment.

Moving from PD to the other EL determinants, LGD and LEO, there may be scope to customize the stress-scenario changes to the specific experience of each segment. However, data constraints will exert themselves here. Certainly internal data won't help in most cases, and even the credit-loss databases like LPC and Moody's don't offer sufficient richness of default history, at the segment level, to support this kind of analysis. It's possible that an outside study might shed light on LGD or LEO experience in a particular industry segment, but the more likely, fallback approach would be to rely on the same percentage change in LGD and LEO under stress across all segments, and the same as used for the macrolevel stress testing. The final stage is combining the estimated increases in PD, LGD, and LEO to generate a new EL for the segment. The percentage increase in EL from the base case can be applied to the segment-specific reserves."3 How the resulting dollar increase in estimated losses compares across segments can signal where management attention is most needed, where concentration limits need revisiting, and where loss reserve calculations might be revised.

A Couple of Complicating Factors

First, a recurring issue throughout any consideration of segment-level analysis is the appropriate level of **disaggregation**-how narrowly to define the segments. A trade-off quickly enters here: the accuracy that's obtained from less reliance on broad, crosssectional averages,14 as well as the readier buy-in of affected units that are always attuned to the specifics and anomalies of the industry they deal with, traded off against issues of data availability (at the subsegment level) and the more cumbersome analytics involved in trying to apply different shocks and different sensitivities to too many different pieces. There is no easy answer here, only the need to be responsive to concerns over too much being lumped in together but without attempting to cater to more slicing and dicing than the data and tools available can accommodate.

Second, there's the issue of cyclicality and the need to monitor where the economy and major segments are in their respective cycles. At the industry level, cycles may be closely tied to the general business cycle, as is the case for capital goods industries, for example. In other industries, however, different factors may come into play. The purchase-and-replacement cycle, for example, affects demand for durable goods (for example, the

roughly four-year cycle for autos), though interest rates also exert an influence. In commodity markets, both actual and anticipated shifts in supply can cause extended swings in pricing and activity levels. Portfolio analysis requires understanding the dynamics of industry adjustment, including timing issues (the typical length of a cycle, how quickly a cycle may turn, the leads or lags vis-a-vis other parts of the economy) and severity issues (how pronounced are the cyclical swings in the factors [like pricing, revenues, earnings, stock price] that contribute to changes in default and loss rates in that industry). The economy's and the industry's current circumstances need to be understood well enough to get a feel for the short-term (6- to 12-month) prognosis: Is the industry heading toward a cyclical correction or is the worst over? This, in turn, should become an important element in setting the appropriate stress factors, that is, recognizing that those factors should be changed, or at least reviewed, each time the stress testing is conducted. It's this that gives the exercise context and relevance.

CREDIT STRESS TESTING PROVIDES USEFUL INPUTS TO PORTFOLIO MANAGEMENT

Credit stress testing should be a periodic event, semiannual, perhaps, unless the economic environment has shifted unexpectedly and drastically enough to warrant more immediate scrutiny. It shouldn't be a rote exercise conducted in a vacuum; rather, it needs to reflect changes in the external environment (including the cyclical considerations discussed above) and in the specifics of the banks exposure. That flexibility implies a cooperative effort, working with colleagues who have a firsthand understanding of how the bank targets each segment and how its customers are positioned and performing vis-A-vis the "average" company in that industry. This kind of structure and focus will make the output of the exercise more useful as input into other portfolio management functions: determining reserve (and capital) levels, setting concentration limits, and identifying portfolio segments requiring greater credit scrutiny or control. The fact that it's a more subjective or judgmental exercise (compared to stress testing on individual customers or on market risk), with correspondingly less

precision, doesn't imply that it's not worth doing.

NOTES

1. "A Survey of Stress Tests and Current Practice at Major Financial Institutions," Committee on the Global Financial System (April 2001).

2. See, e.g., K. Beans, "Effective Risk Management Is Sought by Regulators, Bondholders and Shareholders," The RMA Journal (Sep. 2001): 54-56.

3. That is, holding sufficient capital that the bank's probability of defaulting is reduced in accordance with some targeted agency rating. If that's an A rating, and if A-rated companies historically show one-year default rates of, say, 0.1 percent, then capital will be held to reduce the probability of the banks insolvency to 0.1 percent.

4. EL is the product of PD (probability of default), LGD (loss given default), and EAD (exposure at default). EAD is equal to current outstandings plus a portion, LEQ (loan equivalent factor), of any undrawn credit.

5. L. Wee and J. Lee, "Integrating Stress Testing with Risk Management," Bank Accounting and Finance (Spring 1999): 10.

6. However, without a means for centralized access and manipulation of customer files (such as now offered by Moody's Financial Analyst, the Oracle-based upgrade of the FAMAS and FAST financial spread-sheeting programs), this can be too cumbersome an exercise to take on for all but the most limited of samples.

7. Eg., using the bank's own migration analysis and loss factors, with risk grades mapped to some key financial ratio.

8. Procedurally, a generalized equity shock should be adjusted by a company- or sector-specific beta, taken from a source like S&P or ValueLine. A 20 percent equity shock, for example, applied to a company with a 1.50 beta, would become a 30 percent equity price change for that company or sector. That revised (reduced) equity price is then used to recompute the company's PD.

9. The 300-basis-point rate increases of 1988 and 1989 and 1994 provide a good illustration. The former was followed by a recession and a stock market slump, the latter by just the opposite.

10. If all three are calculated separately and then simply added together, then total risk will be overstated, unless there's perfect correlation between them.

11. OCC AL 97-3: 6.

12. A Merton model premises equity ownership as tantamount to holding a call option on the firm's assets. If the market value of those assets, which can be inferred from equity value, exceeds the value of liabilities when the latter come due, then the equity holders have an incentive to

exercise that option (i.e., repay the obligations) and reclaim assets from the firm's secured debt-holders. Equity value thus has an indirect connection to default probability (as captured in KMVs EDF (expected default frequency)).

13. Apportioning reserves to a segment can be computed based on the distribution of internal risk grades within the segment and the loss (migration) factors that translate risk-grade exposure totals into required loss reserves.

14. Oil and gas, for example, may at first look like a relatively homogeneous mass of credit exposure, but when companies in that industry are subjected to an oil price shock, the impact will be very different for exploration and development companies compared to (nonintegrated) refiners. Rather than a highly positive loss correlation, there may even be negative correlation between those two subgroups. Even when there's greater similarity across companies in the impact effect of a stress event, default and loss cor-relations may be reduced, perhaps significantly, by the dynamics of industry adjustment. When some companies fail, the credit strength of remaining players improves, which can be an important consideration where there are sound demand fundamentals but overcapacity-the shakeout of discount retailers in the early 1990s, for instance.

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Geographic Names: United States; US

Descriptors: Commercial credit; Credit risk; Risk management; Risk assessment; Loan portfolio management; Bank loans
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Transition strategies

Stark, Roger D

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Abstract:

Latin America represents an important emerging market that will require construction of extensive new electric generating capacity. The capital to construct and operate such new capacity, however, will not be available from indigenous public and private sector sources in the region. Indeed, the economic integration of the region may soon require Latin American countries to compete against each other for scarce capital resources. US and other non-Latin American investors have experimented with several cross-border investment vehicles, bit none have emerged as models for future development. What seems to be lacking is a set of strategies for expediting cross-border capital formation. Adding to the challenges posed by these deficiencies are a variety of regulatory environments and a population of developers and investors with differing objectives.

Text:

Headnote:

At various stages in the transition toward competitive power markets, Latin American countries hold challenges and opportunities. Success requires careful consideration of market conditions.

Latin America represents an important emerging market that will require construction of extensive new electric generating capacity. The capital to construct and operate such new capacity, however, will not be available from indigenous public and private sector sources in the region. Indeed, the economic integration of the region may soon require Latin American countries to compete against each other for scarce capital resources.

U.S. and other non-Latin American investors have experimented with several cross-border investment vehicles, but none have emerged as models for future development. What seems to be lacking is a set of strategies for

expediting cross-border capital formation.

Latin America lacks highly creditworthy utilities and risk capital. Adding to the challenges posed by these deficiencies are a variety of regulatory environments and a population of developers and investors with differing objectives. An understanding of each of these market realities is essential to developing successful strategies for the region.

Market Environments

In broad terms, the Latin markets reflect three different market environments. **Disaggregated** and competitive markets exist in at least two Latin American countries. Other countries reflect a transitional structure not unlike the present state of the U.S. markets. Still other countries reflect early transitional structures with historical roots in government resource planning through parastatal utilities.

The most fully **disaggregated** markets exist in countries that implemented comprehensive supply side oriented macroeconomics programs in the 1980s. These countries have emphasized efficient price signals aimed at modulating growth in the production sector.

Chile and Argentina are perhaps the best examples of **disaggregated**, competitive markets. Both markets share regulatory systems that emphasize efficient price signals. Long-term contracting is permitted, but in Argentina low energy rates from existing government-subsidized hydropower facilities have made energy purchasers reluctant to commit to long-term pricing.

The market structures in Chile and Argentina facilitated initial privatization of electric utilities in both countries. Foreign investors took comfort in the virtual absence of governmental regulators in the wholesale rate-setting process. The lack of price certainty was seen as both the lesser of two evils and a market risk that could be reliably forecast with proven economic models. Although few would deny that the Chilean and Argentine markets are today both open and freely competitive, many of the bidders in the initial privatizationsparticularly in Argentina-have found that their market assessments underestimated the consequences of inexpensive hydropower in general, and the Yacyreta effect in particular.

By contrast, transitional environments are prevalent in markets where traditional demand-oriented regulation has held sway. The United States represents perhaps the most elaborate example of a demand-oriented system of regulation transitioning to a market-oriented environment, but several Latin American countries also fit this description.

Brazil, for example, has begun the process of introducing private power as an alternative to government procurements. Law 9074, passed last July, provides legal recognition of independent power producers and contemplates open access transmission to facilitate power marketing transactions. Brazil's reforms to date have been significantly less decisive than those undertaken in Chile and Argentina. The legislation passed by the Brazilian Congress has been less than unequivocal in charting a course toward competitive markets. In particular, the Independent Power Law enacted by

the Congress has not yet been followed by implementing regulations from DNAEE, the pertinent regulatory body.

In Colombia, the transition to private power has accelerated. The Mamonal project provided one of the first applications of traditional project financing techniques. Long-term contracts are being implemented in both inside-the-fence and sales-to-the-grid contexts. Privatization of state-owned assets also is contemplated, albeit on a long-term schedule.

Countries beginning a transition from government-dominated to competitive power markets have faced different obstacles. Some remain mired in political disputes. Others have proceeded to implement incremental reforms without considering the requirements to attract private foreign investment.

Central America provides good examples of markets that have encountered significant obstacles in proceeding toward a more investor-friendly climate. Guatemala experienced several miscues, including one that contributed to the toppling of a president, on the path to rationalizing its tariff structure. Similarly, Nicaragua's postSamosa regime has experienced at least two false starts in its effort to attract private foreign investors to the power sector.

Mexico implemented an independent power statute and accompanying regulations in 1993, but the peso crisis, together with continuing struggles among CFE, SEMIP, and other Mexican governmental entities, have continued to muddy the waters for foreign investment. The anticipated surge of Mexican projects is just beginning to materialize.

While demand for new capacity in most Latin American countries remains strong, relatively few projects have proceeded to financing. In large part, the reasons for this situation reflect an inability to satisfy transactional requirements.

Transactions And Players

Private power transactions to date have fallen into two broad categories. Assettransfer transactions made up the initial wave of private power deals in Chile and Argentina, and more recently have been central to private power transitions in Peru and Bolivia. Greenfield project development has been successful in a few Latin countries, such as Colombia and Guatemala, but has not yet taken hold as a mainstream vehicle for private power procurement.

The reason for this track record has much to do with prevailing market models. The supply side orientation in Chile and Argentina has been conducive to attracting privatization bidders because investors viewed those markets as providing a healthy trade-off of reduced political and regulatory risk for market risk. On the other hand, the lack of creditworthy utility purchasers authorized to enter into longterm contracts helps to explain the relative scarcity of greenfield projects to date.

Privatized and parastatal utilities present what may be the greatest hurdle to greenfield projects selling into the grid - lack of investment-grade credit to support project financings. This credit gap may cause some market

participants to conclude that feasibility of project financing is a key selection criteria. Others will pursue alternative financing in an effort to capture market share. Successful responses to the credit gap problem will be responsive to the objectives and attributes of each market participant.

In the near term, privatizations may continue to be the centerpiece of Latin America's shift to private power. Markets implementing competitive pricing models will continue to be favored because they facilitate the privatization activity and lay the groundwork for future private investment. However, there is a growing sense that the trend of highly successful assettransfer transactions is nearing its end.

The universe of developers pursuing opportunities in Latin America can be viewed as fitting into four general categories: equipment suppliers, fuel suppliers, electric utility affiliates and traditional IPP developers. Each category of developer has different selection criteria and return of capital requirements. Each category also has a different appetite for risk. Equipment suppliers that previously sold their products to public sector utilities are now refocusing their efforts on projects that can yield both equipment sales and long-term capital returns. These developers are focused on strategies that harmonize the equipment sale and direct investment arms of their businesses.

Fuel suppliers with a long-standing presence in the Latin American petroleum products market (i.e. major oil companies) have begun to view independent power as a vehicle for diversification. These companies perceive internal synergies between their fuel business and the power plants that can become major fuel customers. Equally important, the fuel suppliers view electric generating plants as the perfect vehicle for monetizing investments in the nascent Latin American natural gas markets.

Electric utility affiliates have been active participants in the early privatizations, and they continue to pursue private power opportunities in transitional and post-transitional markets. This reflects an effort to optimize core business capabilities by operating newly spun-off utilities in politically stable competitive markets.

Because U.S. electric utilities have generally focused on long-term income rather than capital growth, they have often targeted longer-term investments. The Latin market investments made to date by electric utility affiliates reflect a similar approach.
Traditional IPP developers constitute a fourth, less homogenous group of market participants. Some are relatively well-capitalized public companies with extensive development staffs, while others are relatively small operations that outsource all but the core development activity. This group tends to reflect more organizational agility than the others, but also may be constrained by shorter-term investment criteria.

Each of these developer groups has adopted its own set of project selection criteria. Effective criteria generally optimize the developer's key attributes and target attainable investment objectives within pre-established risk parameters.

In some cases, development strategies are driven by a need to pursue objectives dictated by a corporate parent. In other cases, strategies reflect the need to achieve a targeted economic return. Nearly all strategies share a theme of using aggressive capital to facilitate project development and financing.

Equipment companies have perhaps been most aggressive in the greenfield area. Relying in part on margins built into their hard assets, development affiliates of equipment vendors have offered economic inducements in the form of bridge financing and equity investments. To date, the majority of these inducements have been offered in the context of greenfield projects, but a new hybrid model is now emerging.
In mature markets where dispatch priority is based on actual or bid energy pricessuch as Argentina-plant efficiency will determine the project's place in the dispatch queue, and in some cases will determine whether the plant runs at all. Owners of privatized utilities in these markets are beginning to implement repowering projects designed to upgrade equipment efficiency and reliability.

These repowerings offer opportunities for synergy between utility companies and the equipment suppliers that support the repowering effort. Because many of the owners of privatized utilities entered into their investments with a long-term investment horizon, repowering projects offer the potential for enhancing long-term profitability of utility projects while also satisfying the near-term objectives of an equipment supplier partner.

A different type of synergy is being pursued by fuel suppliers. Many fuel companies with existing petroleum interests are seeking to optimize their existing operations by linking them with a base-load power plant. Also, competitive threats to existing market share have in some cases prompted fuel suppliers to make strategic power sector investments designed to capture new high-volume customers. Similarly, natural gas reserves discovered in connection with petroleum exploration activities can be readily monetized when converted to electricity in adjacent or nearby generating facilities.
Cross-border projects often require extensive risk mitigation, particularly during the construction period. Financing of these projects, in particular, can often require aggressive risk-sharing arrangements that transcend the models developed in the U.S. PURPA-driven markets.

Traditional development companies have sought to enhance project economics and mitigate risks through creative structuring. Lacking the internal synergies that exist in the equipment and fuel supplier contexts, these companies have begun to use long-term strategic relationships as the basis for ad hoc team development efforts.

One example of aggressive risk-sharing can be seen in arrangements pertaining to construction risk. Turnkey contractors in the United States have traditionally bargained for liability caps, including liquidated damages, in the range of 25 percent to 50 percent of the contract price. In many projects outside the United States, these caps are being raised to amounts approaching, and sometimes exceeding, 100 percent. The price for such risk-sharing can include equity shares combined with a preferential

call on project cash flow. The strength of this approach is that it facilitates development of risk-intensive projects that may yield excellent returns even though they lack characteristics that would make them attractive to other market participants. The difficulty lies in the potentially expensive trade-offs that occur in the risk-allocation process. A final strategy beginning to take hold in emerging markets like Latin

America pertains to fuel flexibility. Generation and system-control technologies have evolved to a point where single-fuel plants soon may become more the exception than the rule. Because of the nascent state of fuel markets in Latin America, particularly natural gas, plant designs that can economically accommodate multiple fuels will provide a significant advantage for projects bidding into an economic dispatch queue.

At bottom, the success of developer strategies will turn on the extent to which projects can attract cross-border investment. Even the most exemplary privatizations of the past few years may not support traditional project-financed debt any time soon. For economies with surging power procurement demands, the transition from public to private financing is inspiring a search for new financing structures and new credit support and credit enhancement vehicles. Successful projects likely will follow one or more of the following approaches.

Sources of Financing

Effective development strategies will distinguish between commercial and financial viability, and will assess each concern at the appropriate point in the development cycle. Commercial viability will be considered using pro forma economics that reflect an assumed cost of capital. Financial viability will test the extent to which capital cost assumptions can be realized using available financing sources.

Many commercially viable projects will be rendered infeasible due to the scarcity of suitably priced capital. On the other hand, commercially marginal projects may be able to enhance their financial feasibility by using financing sources that reduce the project sponsor's overall cost of capital.

Under the U.S./PURPA model, project developers maximized the benefits of wellcapitalized and rated off-take purchasers namely, investor-owned utilities- that constituted their primary market. In this environment of high-quality cash flow, developers sought to maximize both the number of projects in their portfolio and their ownership interest in each project. These objectives dictated aggressive use of leverage with the goal of allowing each project to constitute its own credit support-traditional non-recourse project financing.

In Latin America, projects with comparably high quality cash-flow may be more the exception than the rule, and commercial feasibility may often be assessed by reference to merchant plant or spot sales

scenarios.
Project **portfolios** are as likely to be driven by risk-spreading considerations as by an objective to maximize ownership of each project.

Equally important, lowcost-and in many cases subsidizedhydropower may impose an artificial cap on energy prices.
Given this backdrop, existing high-cost capital sources-including project finance debt-may not satisfy the financial requirements for all commercially feasible projects. Some projects will proceed with 100 percent equity financing, during and after construction, until suitable term debt can be placed. Others will implement multitranche financings using international financial institutions, export credit agencies and commercial lenders. Yet others will access the capital markets to monetize the value of early development efforts.

As the flow of commercially feasible projects increases, demand will increase for low-capital-cost financing options, and new debt and equity products may become available to meet this demand. Some may rely on third-party debt and equity commitments to mitigate project capital requirements, while others will employ third-party credit enhancement to reduce capital costs. Where possible, securitization techniques will be used in connection with commercial paper and other instruments providing access to traditional money markets.

Business Relationships

Differences in local power markets require differences in development, financing and investment approaches. The power markets of Chile bear little resemblance to the markets in Guatemala, and failure to appreciate these differences has often resulted in flawed development strategies.
U.S. business culture is result-oriented and income driven. The same can be said for some of the largest and most sophisticated Latin firms. However, the majority of business people in Latin America are relationship-oriented and are not used to immediately proceeding from initial introductions to intensive negotiations over basic business terms.

Because relationship-building takes time and resources, many U.S. companies have found significant value in teaming and affiliating with local partners having existing business networks. Good examples of this approach can be found in some of the consortia that have purchased utilities in Argentina, Peru and Bolivia. Almost without exception, participants in these transactions will confirm that their local partners have played key roles in establishing trust, facilitating negotiations and resolving potential disputes. By contrast, some of the most widely publicized development mishaps have involved projects without local partners.

Scarcity of capital is a fundamental economic principle. Scarcity of lucrative and risk-free project development opportunities in Latin America is an empirical fact. The challenge confronting the Latin markets is how to facilitate development opportunities that yield a competitive, risk-adjusted rate of return to investors.

As the Latin markets compete for capital, so will developers compete for existing development opportunities. Competitive power pricing and deficiencies in off-take purchaser credits limit the availability of traditional project financing, but corporate finance and non-traditional structured finance vehicles may emerge to fill the gap. Local partners, market intelligence and structuring expertise, together with well-crafted

financing vehicles to access cross-border risk capital, all will be key elements to success.

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THIS IS THE FULL-TEXT.

Geographic Names: US; Latin America

Descriptors: Nonutility generators; Infrastructure ; Emerging markets; Foreign investment; Strategic planning; Manycountries

Classification Codes: 9190 (CN=United States); 9173 (CN=Latin America); 8340 (CN=Electric, water & gas utilities); 1300 (CN=International trade & foreign investment); 2310 (CN=Planning)

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S2         926    S S1 NOT PY>1999
S3         213    S S1 AND S2 AND AGGREGAT?
S4           0    S S1 AND S2 AND DISAGGREGAT$
S5       61410    S FUTURE? (N2) VALUE?
S6          43    S S1 AND S2 AND S5
S7         680    S (PORTFOLIO? (N2) SCENARIOS? OR PORTFOLIO? (W2) SCENARIOS?)
S8           0    S DISAGGREGAT$
S9           1    S DISAGGRAT?
S10      18318    S DISAGGREGAT?
S11          2    S S7 AND S10
S12          2    RD  (unique items)

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19/8/1 (Item 1 from file: 15) Links

ABI/Inform(R)

02750010 640264801

****USE FORMAT 7 OR 9 FOR FULL TEXT****

Characteristics of German Real Estate Return Distributions: Evidence from Germany and Comparison to the U.S. and U.K.

Word Count: 8195 **Length:** 18 Pages

Jan-Apr 2004

Geographic Names: Germany; United States; US; United Kingdom; UK

Descriptors: Rates of return; Real estate; Comparative analysis; Studies; Appraisals

Classification Codes: 9190 (CN=United States); 9175 (CN=Western Europe); 9130 (CN=Experimental/Theoretical); 3400 (CN=Investment analysis & personal finance); 8360 (CN=Real estate)

Print Media ID: 34769

19/8/2 (Item 2 from file: 15) **Links**
ABI/Inform(R)

02606641 351058751
****USE FORMAT 7 OR 9 FOR FULL TEXT****
Epistemology, research methodology and rule 702 of the federal rules of evidence versus Eva(R)
Word Count: 9525
Jun 2003

Descriptors: Studies; Epistemology; Research; Methods; Value added; Ethics
Classification Codes: 9130 (CN=Experimental/Theoretical); 2410 (CN=Social responsibilities)
Print Media ID: 15840

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19/8/8 (Item 1 from file: 16) **Links**

Gale Group PROMT(R)

10158224 **Supplier Number:** 91707414 **(USE FORMAT 7 FOR FULLTEXT)**

Assessing the incremental value of option pricing theory relative to an informationally passive benchmark.

Fall , 2002

Word Count: 10829

Publisher Name: Euromoney Institutional Investor PLC

Descriptors: *Mathematical models--Usage; Derivatives (Financial instruments)--Research; Portfolio management--Research

Event Names: *310 (Science & research)

Geographic Names: *1USA (United States)

Product Names: *8525200 (Economics); 9912130 (Econometrics & Model Building)

Industry Names: BANK (Banking, Finance and Accounting); BUSN (Any type of business)

NAICS Codes: 54172 (Research and Development in the Social Sciences and Humanities)

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19/8/9 (Item 1 from file: 148) **Links**

Gale Group Trade & Industry DB

0020005614 **Supplier Number:** 147793512 (USE FORMAT 7 OR 9 FOR FULL TEXT)

After VaR: the theory, estimation, and insurance applications of quantile-based risk measures.(value at risk)

June , 2006

Word Count: 19945 **Line Count:** 01619

Industry Codes/Names: BUSN Business; INSR Insurance

File Segment: TI File 148

19/8/10 (Item 2 from file: 148) **Links**
Gale Group Trade & Industry DB

11791955 **Supplier Number:** 58678471 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Open Market Stock Repurchase Signaling.(Statistical Data Included)

Summer , 1999
Word Count: 9266 **Line Count:** 00806
Industry Codes/Names: BANK Banking, Finance and Accounting; BUSN Any type of business
Descriptors: Stock redemption--Analysis; Corporations--Finance; Financial instruments-- Usage; Stocks--Management
Geographic Codes: 1USA United States
File Segment: MC File 75